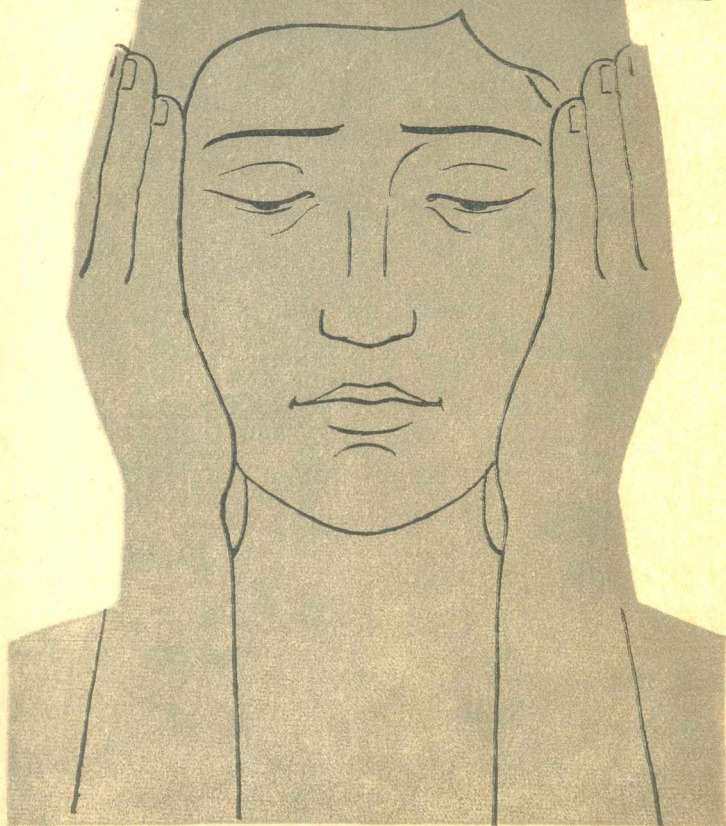


**V.E.Grechko**

# **HEADACHE**



**MIR PUBLISHERS**



# *HEADACHE*

В. Е. Гречко

# ГОЛОВНАЯ БОЛЬ

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V. E. Grechko

# HEADACHE

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by  
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## TO THE READER

Mir Publishers would be grateful for your comments on the content, translation and design of this book. We would also be pleased to receive any other suggestions you may wish to make.

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*На английском языке*

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## INTRODUCTION

Headache... There is hardly a person on earth who does not know what a headache is, that unpleasant, distressing, torturous and, in some cases, intolerable sensation. Studies indicate that 50 to 90 per cent of the population in various countries suffer from headaches.

The headache has been known from time immemorial. The ways a headache is manifested are many and varied. This has been observed not only by researchers but also by patients themselves. For example, one of our female patients once told me that she gets headaches from different sources and knows quite well when headache is caused by a fever, elevation of blood pressure, migraine, or when a headache develops for reasons she cannot exactly define.

From this fact alone we can conclude that the causes of headache are as different as the mechanisms by which it develops and the individual features each headache manifests.

It is necessary to bear in mind that in addition to the primary causes for a headache, there are secondary causes that can provoke a headache. For instance, everybody knows that unpleasant news alone is not the cause of a headache, since in the majority of cases a headache does not follow unpleasant news. Some peo-

ple, however, may develop headaches after negative (occasionally even after positive) emotions. Certainly, here unpleasant news appears to be a factor which, in the presence of definite alterations in the body, promotes a headache to develop. The causes of headache are many and varied, among them are trauma, infectious diseases, intoxications, endocrine abnormalities, and vascular and visceral diseases.

Just as there are many causes for headaches and many mechanisms for their development, there are many different methods for their relief. It is a common misconception that any headache will partially or fully disappear by taking an analgesic.

Unfortunately, the pharmaceutical institutions of this country not infrequently contribute to this misconception. The overwhelming majority of pharmacies sell a great many drugs commonly termed "headache remedies". They are recommended and sold for patients without due regard for the causes and mechanisms of headache origin. This state of affairs cannot be regarded as normal despite the fact that sometimes taking analgesics alleviates or even completely eliminates a headache. The use of drugs without studying the causes and mechanisms for headaches may appear not only unhelpful but even harmful for a patients' health.

In medicine, headaches are usually divided into two main groups: symptomatic headaches which are a symptom of a disease and headaches as underlying disease. This division was clearly illustrated by an article published in the journal "Science and Life" (Nauka i zhizn) entitled "Have a headache... Please, have your kidneys examined". It was about a young woman who suffered from headaches for over 2 years. She took the common remedies for headache relief, such as analgin, citramon, and pentalgin. At first these

drugs were helpful but later on they failed to alleviate headache. The woman decided to consult a physician, and the examination revealed that she suffered from a chronic renal disease. The headache she had was actually a symptom of a latent renal disease (pyelonephritis); the headache was a symptomatic headache. The migraine is an example of a headache that is the basis for a disease. In a majority of cases, a headache is a symptom of a disease which may be either acute or chronic.

Often headaches are one of the consequences of a disease suffered by a patient. As a result of disease or congenital weakness in some of the bodily systems the state of the nervous system can be altered, causing a neurogenous or psychogenous headache, i.e. a headache associated with overstrain of the basic nervous processes: stimulation and inhibition. This type of headache is called functional headache and is relieved by taking analgesics. Fortunately, about 90 per cent of all headaches are functional headaches, about 8 per cent are vascular headaches, and only 2 per cent of headaches result from an immediate damage to the nervous system. That is why the first appearance of a headache should not be diagnosed as a cerebral tumour, which is often the case. At the same time, one should not remain indifferent to the symptom. In all cases of long-term or recurrent headaches, it is necessary to consult a physician.

Since the headache is a symptom of numerous diseases, it often has features characteristic of this or that disease. Knowing precisely the nature of a headache, the time of its appearance, localization, severity, duration, and features of the course it takes, the physician will be able to make an accurate diagnosis in most cases and, hence, prescribe an appropriate treatment.

Making a correct diagnosis is, therefore, dependent in many respects on how the patient would relate his complaints. If the patient is willing to receive qualified medical help, he should not confine himself to the phrase "I have a headache" but describe his sensations of pain in considerable detail.

In view of the fact that the present booklet is not intended for the medical profession, it only deals with the general principles of treatment and prevention of the headache. The booklet should not be regarded as a popular manual for treating headaches, especially the self-treatment of headaches. In the USSR, there is no need for treatment without medical control, since this country ranks first in the world as regards the number of physicians.

One of the main objectives of the booklet is to acquaint wide circle of readers with the clinical manifestations and the variety of the causes of headaches. Having read this booklet the reader will be able to understand that a headache can hardly be classified as a harmless symptom and that its relief requires a special approach to each individual case, including special methods for examination and treatment based on the study of mechanisms by which headache develops.

SOME DATA ABOUT PAIN  
IN GENERAL AND SENSITIVITY TO  
PAIN IN THE HEAD

Pain and headache have been known to mankind for a long time. Different methods for their treatment have also been known for a fairly long time. In ancient stone inscriptions made over 5 thousand years ago, one comes across the term "a headache sufferer".

In China, headaches were treated over 2.5 thousand years ago. In the book entitled "Chjihchuang" (581 B.C.), Chinese physicians recommended that a headache should be treated by Chen-chiu therapy (acupuncture and cauterization).

According to the ancient Greek historian Herodotus, the priests of ancient Egypt who were also doctors specialized in the treatment of different diseases; among them were priests who treated the headache alone.

References to patients suffering from headache can be encountered in the works of the great physician Hippocrates who lived almost 2.4 thousand years ago (460-377 B.C.). The Greek philosopher Socrates (470-399 B.C.) and his pupil Plato (428-348 B.C.) observed the relationship between tension or excitation and headache. Soranos of Ephesus, an ancient Greek physician (98-138 A.D.), who practiced in Rome, provided a strikingly informative description of both the

chronic headache and migraine. The ancient Roman physician and naturalist Claudius Galen (129-199 A.D.) introduced the term "hemisrania" to designate the pain which involves one side of the head. He recommended that this condition could be treated by a correct diet, gymnastics, baths, massage, and blood-letting.

Further progress in the study of headache was also contributed to by the Arab medical profession: Al Farabi (870-950), Abu Reichan Biruni (973-1048), and Abu Ali al Hussein ibn Abdallah (Avicenna) (980-1037), particularly. In his famous encyclopaedia, the Canon, Avicenna described several types of headache including the migraine. Many approaches to and methods for headache treatment presented in Avicenna's Canon have not lost their significance even today.

The brief data given here from the history of study on the headache indicates that, according to historians, mankind has been suffering from headaches for more than 5 thousand years but still cannot get rid of it. One can pose the question whether the headache is a necessity for man or can man do without it?

However, before discussing headaches it is necessary to say a few words about pain in general.

**Pain and sensitivity to pain.** Pain is one of the most common sensations. Many people know very well that the nature, severity, duration, localization, and other characteristics of pain may vary. Pain is a distressing sensation and the sufferer tries his best to get rid of it. At the same time we observe that pain is helpful, inasmuch as it makes the sufferer alert to trouble in the body. The ancient Greeks said that pain is "the watchdog of health". Pain alerts the body to hazardous actions of mechanical, chemical, electric and other injuries, burns, frostbites, etc. But pain not only warns against trouble. It makes the body mobilize its

forces to eliminate the causes which provoke pain. This is done by means of reflexes. It is known that reflex is a body response to the action of different stimuli. Indeed, once you touch something hot or very cold, sharp or something similar that might be hazardous, you promptly remove or withdraw from the source, namely from the action of a harmful factor.

Thus, pain not only plays the role of a signal but also acts as a defense mechanism. There are people who are unable to feel pain. This disorder may be caused by a rare congenital defect or may be a consequence of what is called syringomyelia, a nervous system illness, or haematomyelia, a haemorrhage to the spinal cord. Such people fail to avoid the action of a harmful factor in time and, thus, may fall a victim to chance, although they always take precautions. They may also have scarred skin caused by burns, wounds, exposure to x-rays, and so forth.

However, difficult it is for someone unable to feel pain, he can hardly withstand pain which persists for a long time. Having fulfilled its protective function, pain becomes the worst enemy of the body. Pain reduces motor activity, causes sleep disorders, loss of appetite, etc.

Marked physiological and biochemical alterations may develop in the body. When pain occurs for the first time, such alterations are natural and necessary. When they intensify, they may become irreversible and impair the vital activity of the body. If such alterations are not eliminated in time, they may eventually cause death.

Man feels pain due to the activity of the nervous system. The main parts of the nervous system are the brain, spinal cord, nervous trunks, and their apparatus (receptors, sensitive nerve endings by which external stimuli are transformed into nerve impulses).

The brain and the spinal cord constitute the *central nervous system*, whereas the remaining parts of the nervous system make up the *peripheral nervous system*. The most important subdivisions of the brain are the cerebral hemispheres and the brain stem. The hemispheres contain the white matter (nerve transmitters) and the grey matter (neurons). The grey matter is located mainly on the surface of the hemispheres, forming the brain cortex. It is also located in the depth of the hemispheres in the form of individual accumulations of cellular groups which are called subcortical nuclei. The thalamus (both left and right) among them is essential for the formation of painful sensations. These nuclei concentrate the cells responsible for all types of body sensitivity. In the brain stem, the accumulations of grey matter cells form the nuclei of the cranial nerves, from which the nerves that ensure the sensitivity and motor reactions of the organs originate.

In the course of the long-term adaptation of living beings to the environment, the body has formed special sensitive nerve endings that transmute the different-type energy coming from external and internal stimuli into nerve impulses. These nerve endings are called receptors. The structure and function of receptors are extremely diverse. Receptors are present in practically all tissues and organs. Some of them appreciate tactile stimuli (touch, pressure, body weight, etc.), whereas others (thermal) the sensation of warmth, cold and their combinations. The third group of receptors appreciate the action of different chemical substances. Pain receptors have an extremely simple structure. Painful sensations are received by the free endings of the sensitive nerve fibers. As far as their structure is concerned, pain receptors of head do not differ from those present in other divisions of the body.

Pain receptors are distributed nonuniformly in different organs and tissues. They are present in the greatest number on the tips of the fingers, the face and the mucous membranes. Vessel walls, tendons, meninges, and the periosteum (surface membrane of the bone) are rich in receptors. We know how painful it is to be struck on the periosteal area, on parts not covered with soft tissues like the anterior surface of the leg. At the same time operations performed on the bone are painless, since the bone has no pain receptors. Few pain receptors are present in the subcutaneous fat. No pain receptors are found in the brain substance. In view of the fact that the meninges are supplied with a great many of pain receptors, compression or distension of the meninges produces rather appreciable painful sensations.

Sensitivity to pain not only depends on the quantity of pain receptors but also on the age and sex. Children are more sensitive than adults, women are generally more tolerable and more patient than men. There is a definite relationship between pain sensitivity and psychic status. Everything that promotes the distraction of attention from pain stimuli minimizes the painful sensation. This may account for the reduction or elimination of painful sensations during affects, ecstasy, rage, and fear. A man carried away by something does not sense pain. For instance, during a battle he may not notice a wound. On the contrary, painful sensations increase during a depression, physical fatigue, and nervous breakdown. Expectation and apprehension make painful sensations more intense. This is also observed in the absence of distracting moments. Increases in all types of pain during the night hours are also accounted for by this circumstance.

Pain impulses appreciated by receptors are conveyed by a complex route through special sensitive

fibers to the different regions of the brain, eventually reaching the cortical cells of the cerebral hemispheres.

The centers of pain sensitivity are situated in the different parts of the central nervous system.

The activity of the brain cortex depends, in many respects, on the special structure of the nervous system, namely the reticular formation of the brain stem, which may both activate and inhibit the cortical activity of the cerebral hemispheres.

**Sensitivity to pain in the head.** Let us consider separately the innervation of extra- and intracranial head formations. The most superficially lying head formation is the skin. The subcutaneous fat, muscles, tendons, periosteum and, finally, cranial bones lie beneath it. Extracranial formations also include the oral cavity, throat and larynx. All these structures are supplied with receptors which appreciate different stimuli: pain, temperature, tactile, and so forth.

The face and the anterior part of the head are innervated by the trigeminal nerve, and the occipital region by the occipital nerves.

The oral cavity is mainly innervated by sensitive branches of the trigeminal nerve, closely linked with the vegetative ganglia and located in the head. These links determine the appearance of autonomic disorders during headaches and facial pains which are manifested by flushing of the face or turning pale, enhancement of perspiration and salivation, pupil dilatation, etc.

All the nervous branches are interrelated, therefore pain spreads to different parts of the head and face. For instance, pain felt in a sick tooth located in the lower jaw involves the same side of the head and occasionally the entire head; pain concentrated in the occipital region gradually invades the temporal and frontal parts of the head.

Sensory receptors are present in the walls of blood vessels, arteries and veins, particularly in the extra-cranial part of the head.

The meninges, brain substance, and vessels are the main intracranial formations of the head. The brain is covered with three membranes. The outermost membrane is called the *dura mater*. The so-called arachnoid (derived from the Greek word *arachne* meaning a spider) lies beneath the *dura mater*. The vascular membrane is adjacent to the brain. The arachnoid and the vascular membranes are an integral structure, almost along their whole length. This membrane is called the *pia mater*.

The *dura mater* is composed of two mostly fused layers: an endosteal outer layer adherent to the inner aspect of the cranial bones, and an inner, meningeal layer. Venous sinuses and the trigeminal ganglion are located between the layers.

The so-called subarachnoid space, a slit-like space permeated with numerous connective fibers, occurs between the arachnoid and the *pia mater*. It is filled with a fluid secreted by vascular plexuses. This fluid is termed liquor (from the Latin word *liquor* meaning liquid, moisture), or cerebrospinal fluid. Outflow of the cerebrospinal fluid to the venous system is ensured by special formations. The arachnoid is devoid of any vessels.

The vascular membrane has a lot of vessels. Their walls contain diverse, complex-structured sensory receptors. Their fibers are intercombined to form a number of nervous plexuses in the vascular membrane. Many fibers occur particularly at the base of the brain.

As we have just seen, the various structures in the

head contain varying amounts of receptors sensitive to pain. This may account for the dissimilar pain sensitivity of different tissues in the head. Skin on the head reacts very rapidly to mechanical, temperature (hot and cold), chemical, electric, and other types of stimulation. The subcutaneous tendons are sensitive to the mechanical stimuli only. Sensitivity to pain of the cranial periosteum is also different: the most sensitive to pain stimulation is the area of the superciliary arch and the lower part of the temporal bone.

Higher pain sensitivity is common to the cranial arteries; the cerebral arteries are sensitive only to pain occurring in the region of the base of the brain (cerebellar arteries) and in the posterior cranial fossa.

As far as the brain membranes are concerned, the most sensitive is the vascular membrane and then the dura mater. However, the pain sensitive formations situated in this area respond to pain in a different way. Those parts of the brain membranes that are located in the base of the skull, mainly in the anterior cranial fossa, as well as at the sites innervated with venous sinuses and cerebral veins are most responsive to pain stimuli.

What are the main factors responsible for stimulating pain receptors and the mechanisms by which a headache develops?

**The main mechanisms by which a headache develops.**

It is customary to regard a headache as a painful sensation felt inside the cranium or simultaneously inside the cranium and in different parts of the head.

A headache is mainly a symptom, not a disease. Headaches vary with organic and functional diseases. Organic diseases are characterized by structural alterations in body tissues. In functional diseases, no conspicuous changes are detectable in the structure of the body tissues, but interactions between individual

components and systems of the body are impaired. For instance, organic diseases of the nervous system encompass brain tumours, brain contusions, and haemorrhages, whereas functional diseases include neuroses (hysteria, neurasthenia, etc.). If the cells of the brain cortex fail to interpret pain impulses, a headache does not ensue. This can be demonstrated by observing body function when the activity of the nervous processes that occur in the cells of the brain cortex is inhibited. A headache is not felt during deep sleep, anaesthesia or powerful emotional excitation, hypnosis, etc. In these cases, the cortex fails to appreciate pain stimuli and the man does not sense any headache. Therefore, stimulation of pain receptors present in different structural formations of the head and transmission of impulses to special divisions of the brain, including the cortical cells where a sensation of headache is formed, play an important part in the mechanism of headache development.

As already indicated, receptors are influenced by different types of energy: mechanical, thermal, electric, radiation, and chemical. Their action on the body may be manifested externally and from within.

Many people are familiar with headache that develops as a result of the action on head tissues by mechanical, thermal and other factors. In these cases, impulses originating in pain receptors of the skin, tissue vessels, and other structures are conveyed via appropriate fibers to the brain divisions where a headache sensation is formed. Let us discuss the main factors which lead to stimulation of pain receptors.

**Mechanical factor.** Pain receptors can be stimulated by compressing the nerve endings and nerve fibers of pathological formations and processes located inside and outside the cranium. They include scars, abscesses, aneurysms (local enlargement of the vessels), tu-

mours, cerebral haemorrhages, and inflammatory processes.

Pain receptors can also be stimulated in patients when the blood outflow from the head and cerebrospinal fluid from the brain ventricles is restricted. This may cause the intracranial pressure to increase as a result of which pain-sensitive intracranial formations (meninges, vessels, etc.) become more tense, stimulating the intracranial receptors. For instance, a cerebral tumour compresses the sensitive nerve endings and nerve fibers adjacent to the neoplasm. Pain impulses are conveyed to the central parts of the nervous system where a headache sensation is formed.

**Chemical factor.** Pain receptors can be stimulated by the different poisonous substances that are produced in the body both as a result of its normal activity and the development of pathological processes, as well as by the ingress of hazardous substances from the environment. In most cases, the toxins, formed in the body in the course of various pathological processes which are caused by upset metabolism, bacterial and viral activity, turn out to be harmful substances.

Emphasis should also be laid on adverse effects of the dysfunction of the endocrine glands, gastrointestinal tract, and other organs. This point is illustrated by examples given below.

A first example. A person falls ill with an infectious disease, e.g. influenza. The microorganisms begin to secrete poisonous substances, toxins, which are distributed throughout the entire body, stimulating receptors including pain receptors in different structures, particularly those located inside the cranium. The person senses a headache and pain in the body.

A second example. A person has a thyroid dysfunction. The hormone is secreted by the thyroid in an excess amount and stimulates receptors. Stimulation

is followed by the development of pain in the whole body, headache included.

A third example. A headache often ensues after the oral intake of different toxic substances or drugs. For instance, an intense headache can be provoked by belladonna, opium, alcohol, nicotine, or inhalation of poisonous substances such as carbon monoxide.

In all these cases, the impulses caused by stimulation of pain receptors with chemical substances are conveyed to the brain, and a painful sensation arises.

**Neurogenic and psychogenic factors.** A headache may ensue because of derangement of brain activity caused by unfavourable life situations and psychic traumas or suggestion.

Neurogenic and psychogenic factors which provoke headaches are mediated by many organs and systems of the body. This can be illustrated by the following example. Imagine that you are being offered a lemon. Attempting to stress the high qualities of the lemon, the person who offers it describes its odour, taste and ripeness. To show that the lemon is ripe, it is cut in half with a table knife, which is not sharp enough. Therefore, the lemon is compressed and lemon juice starts dropping from the site of section. Finally, the lemon is cut in half. You can see the lemon pulp, dissected granules, bright, lemon juice-covered surfaces of the lemon halves, leaking drops of lemon juice, and the knife abundantly moistened with juice. To demonstrate that the lemon is ripe more vividly, the lemon lobule is cut and lemon juice starts dropping. It drops from the surface of the section and from the knife. We are convinced that while reading these lines one has a sensation of acid in the mouth and hypersalivation, i.e. reactions to the entry of lemon juice to the oral cavity. Why does it happen? The reader forms an image of the lemon in the brain and

the nervous system conveys impulses to the appropriate glands of the body. This example illustrates the effect of the nervous system on the work of the internal organs, particularly of the glands situated in the oral cavity.

Thus, the psychogenic factor may change the status and functions of different organs and systems of the body by influencing the nervous system. Changes are also experienced in the vascular tone, in the rhythm of the heart and respiratory activity, in the gastrointestinal tract, and so forth. This may result in an increase in the oscillatory mobility of vessel walls, alterations in cerebral circulation, and upset metabolism. The intracranial pressure increases, which leads to the tension of brain structures sensitive to pain and stimulation of pain receptors present in the vessel walls.

The rise of the oscillatory mobility of the vessel wall plays an important role in the development of neurogenic and psychogenic headaches. The question arises as to how pain receptors are stimulated during a rise in the oscillatory mobility of the vessel walls by the lowering of the vascular tone. Pain receptors in the vessel walls are not stimulated if their oscillation due to pulsation does not exceed the normal values. If the vascular tone is deranged, the oscillatory mobility of the vessel walls may increase, thus exceeding the allowable values. Consequently, pain receptors in the vessel walls get stimulated. The impulses from these receptors are conveyed to the brain cortex and the sensation of a headache ensues. To have better insight into the mechanism by which pain receptors are stimulated, an analogy can be made between the stimulation of the pain receptors situated in articular tissues. Until the scope of the movements in the joints exceeds the normal values, no painful sensations will

normally occur. As soon as the normal values are surpassed, the sensory receptors will become, in the majority of cases, stimulated and painful sensation will arise.

Stimulation of pain receptors in the vessel walls proceeds approximately along the same lines. It must also be remembered that the excitability of the central nervous system is of no small importance. If the excitability is increased, the impulses from the receptors, which do not commonly lead to painful sensations, are likely to cause a headache even when the vascular tone and oscillatory mobility of the vessel walls are insignificantly increased.

The mechanism by which a headache develops during stimulation of the receptors in the vessel walls is described below in detail.

We observe that neurogenic and psychogenic headaches do not afflict all people. In which cases do the neurogenic and psychogenic factors act?

Normally a neurogenic or psychogenic headache develops as a result of change in the functioning of the central nervous system, largely in the cortex of the cerebral hemispheres.

In some conditions due to a pathological process or exposure to the environmental factor, the excitability of the central nervous system undergoes alterations or, as the physiologists put it, the threshold of excitability changes.

The increased excitability of neurons is associated with excessive fatigue, oxygen deficiency, intoxications, or the impairment of the activity of some bodily systems (e.g. of the endocrine system during climacteric). It may occur after grave general diseases as well as during the disease itself. In these conditions, the responsiveness of the nervous system changes. Consequently, impulses which do not, as a rule, pro-

voke reactive changes become liminal or superliminal for the central apparatus of the brain, causing painful sensations.

The neurogenic factor is also of importance for the development of what is called a reflected headache as seen in the diseases of the internal organs: lungs, intestine, female sexual glands, and so forth. In these situations the headache may be relieved or eliminated after the cure of the underlying disease. Therefore, it is better to think of the neurogenic and psychogenic factors as provoking a headache rather than causing it.

Thus, the causes of headaches are many and varied. Normally several factors rather than one operate in concert or succession.

One might conclude for the sake of simplicity that the mechanism by which headaches develop is common in every case: this mechanism is triggered by stimulation of pain receptors in the vessel walls of the head, meninges or in brain structures sensitive to pain stimuli. In some cases, the predominant role is played by stimulation of pain receptors in the vessel walls, whereas in other cases, those present in the meninges dominate.

During stimulation of the pain receptors in the vessel walls, pain is likely to be felt by persons with abnormal control of the vascular tone. Each time the heart contracts, the head vessels in such persons may enlarge far more rapidly and intensely than in healthy subjects, after which the vessels may constrict very strongly. An appreciable increase in the oscillatory mobility of the vessel walls results in the nerve endings being stimulated as well. Impulses indicating a vessel wall failing due to overdilation are conveyed to the central nervous system and appreciated by the brain cortex as the sensation of a torturous or

throbbing headache. It should be stressed that this process is not confined to changes in the vascular tone. The impairment of vascular innervation is also manifested by the increased permeability of the vascular wall. In marked conditions, the surrounding tissues begin to be infiltrated with blood constituents and tissue metabolism products contained in the blood. As a result, tissue oedema may develop. The tissues may swell and compress the nerve fibers and nerve endings becoming an additional source for stimulating pain receptors. Tissue oedema causes metabolic abnormalities to develop, forming substances which are complex in composition and structure, and increasing the sensitivity of the nerve endings to pain stimulation.

In recent years peculiar analgesics similar to plant alkaloid morphine have been identified in man. Strange as it may seem they are produced in every individual by a specific tuning of the nervous system. These substances have been called endorphines, i.e. morphines of inner origin. The analgesic effect of these substances turned out to be several tens of times more powerful than that of morphine. It has been discovered that a headache develops if the body lacks endorphines. A headache occurs, however, if pain receptors are stimulated in the brain tissues: in the walls of the cerebral vessels, meninges, and cranial nerves. If the body produces an adequate amount of endorphines, the headache will not occur even when pain receptors are stimulated. This explains why, for instance, an abrupt rise of the oscillatory mobility of the vascular wall is manifested in some patients by headache, whereas in others only by a sensation of enhanced throbbing of the head vessels.

As soon as signals indicating the impairment of the vascular tone are relayed to the central nervous system, the body mobilizes the forces of the physiological

defense system aimed at the normalization of its functions. Substances that make the vascular tone return to normal and strengthen the vascular wall appear in the blood. The enzymes capable of destroying the products of deranged metabolism are activated. The sooner and more actively these processes occur the more rapidly the headache is eliminated.

When **pain receptors of the meninges** are stimulated, a headache develops in the following way. The cerebrospinal fluid (CSF) is located in cavities around and inside the brain and is permanently secreted by the vascular plexuses of the brain and is reabsorbed by the blood. There is a strict equilibrium between CSF secretion and absorption. In pathological conditions of the brain, CSF formation may increase whereas absorption may remain at the same level or even decline. As a result of different pathological processes, the outflow of CSF from the cavities (ventricles) of the brain is impaired. The CSF accumulates in the cranial cavity, thereby increasing the intracranial pressure. Compressing the brain, the CSF makes the meninges, arteries, veins and other brain structures distend. Consequently, pain receptors in these structures are stimulated and impulses attesting to the body failure begin to be conveyed to the central nervous system. These impulses are appreciated as a sensation of a pressing, or tormenting headache.

Stimulation of pain receptors during inflammation of the meninges may be caused by tissue oedema as well as by the effect of the vital activity products of toxins, the infectious agents. Stimulation of pain receptors gives rise to a number of biochemical alterations. Secretion of the substances formed by stimulation of pain receptors may become further a cause of such stimulation. So we have vicious circle responsible for a headache which can be eliminated if the vicious

circle is disrupted and the factors arousing stimulation of pain receptors in the head are abolished. Headache associated with elevated intracranial pressure is usually very intense, persistent, and diffuse. It increases progressively, being accompanied by a sensation of gravity in the head. A headache may be enhanced by laying down or other movements.

As we mentioned before, chemical factors operating outside or inside the body may also be an independent cause stimulating pain receptors, thus developing a headache.

When discussing the mechanisms that develop a headache one cannot help mentioning what is called the muscular headache. It occurs when the cranial muscles are contracted over a long period of time during prolonged emotional stress, and in some extra- and intracranial illnesses. Muscle contraction causes the receptors in the muscular tissue as well as muscular vessels to compress. This leads to the impairment of metabolism and formation of substances which are eliminated by the blood under normal conditions. However, during compression of the vessels, these substances are accumulated and cause pain receptors in the head and neck muscles to be stimulated. In these cases, the headache is generally diffuse, dull, torturous.

It should be mentioned that a headache is always accompanied by some reflex reactions, which at first glance have nothing to do with headache. These reactions may include changes in the heart rhythm and respiratory rate, muscle tension, vomiting, and so forth.

All the data presented above indicate how complex are the mechanisms by which a headache develops. At the same time we observe that the treatment of headaches may be successful when the mechanisms of the development of the painful symptom-complex are understood.

## WHEN DOES A HEADACHE AFFLICT HEALTHY PEOPLE?

Everybody knows from his own life experience that a headache may not only afflict persons with a disease but also healthy people. These people lead a normal way of life, they work and may create outstanding pieces of literature, art, science and technology. According to historic sources, Gaius Julius Caesar, Alexander the Great, the German composer Ludwig van Beethoven, the English naturalist Charles Robert Darwin, the German poet, publicist and prominent master of lyrical poetry Heinrich Heine, the English writer Rudyard Kipling, the English writer, mathematician and logician, the author of the famous fairy tale "Alice in Wonderland" Lewis Carroll, the French writer Guy de Maupassant, the great Russian composer Petr Ilich Tchaikovsky and other remarkable personalities suffered from headaches.

How the fact be explained that the headache very frequently afflicts people who were not regarded as patients before the headache ensued. As soon as headache ceases, they neither consult a physician nor undergo any treatment and continue living a normal life. Doesn't this contradict the scientific conclusion that the headache is always a symptom of a disease?

The point is that absolutely healthy people are encountered extremely rarely. In a majority of cases we deal with *practically healthy people*. As a rule, they do not make any complaints. Such persons feel quite well and work like others. But sometimes during changes in the environmental or internal factors, they may develop a symptom or symptoms: headache, pain in the joints, indisposition, insomnia, etc.

**Which practically healthy people may be afflicted**

**with headaches?** Persons with alterations in the central nervous system, either congenital or acquired as a result of different illnesses (commonly infections), traumas, intoxications, or persons with chronic conditions which may last for years without leading to marked disturbances of the functions who are, as the physicians put it, in a state of compensation. During decompensation, various pathological conditions including headache may develop.

We shall illustrate this point by examples of headaches in subjects having congenital high excitability of the nervous system. These subjects are practically healthy, but different factors, which normally do not stimulate pain receptors in healthy people, stimulate a lot of their receptors, pain receptors included, and headache ensues.

Another example. A man suffered head trauma and developed small foci of haemorrhages to the brain substance, the size of a pin head. The acute disease period being over, the pathological manifestations disappeared, the foci of haemorrhages resolved and were replaced by small scars. The patient returned to his normal activities. The distressing sensations had disappeared, but the small scars made the nervous system highly excitable. It must be remembered that several years are usually required to make the excitability return to normal. Such an excitable person is far from being viewed as absolutely healthy. At the same time he should not be referred to as patient. He remains practically healthy. In this particular case, however, those factors that do not stimulate the pain receptors in healthy subjects may bring about excitation of the nerve endings sensitive to pain receptors, thereby causing a headache.

One more example. A person may be afflicted with a chronic disease which does not manifest in any way

for decades, for instance, with incipient cerebral or coronary circulatory failure, disorders of the endocrine system, and so forth. These diseases make their appearance or, as the physicians put it, are decompensated under definite conditions, e.g. during changes of the environment when higher demands are made upon the body.

What conditions promote the development of a headache in practically healthy persons?

Headaches occur largely under the effect of a change in climatic and weather conditions, as a result of violation of the work, leisure or nutrition routines, insomnia, changes in the environmental conditions (the effect of different energy sources, oxygen deficiency, and so forth), psychogenous influences, the abuse of alcohol and tobacco.

The effects of changing climatic and weather factors on man have been noted long before. It is common knowledge that, basing on their painful sensations, elderly and senile persons can predict that the weather will change 2 to 3 days before and even earlier.

Investigations made by various scientists allow us to conclude that a change in climate and weather may exacerbate chronic diseases of the joints and cardiovascular illnesses. Moreover, it has been observed that during weather changes practically healthy persons may have unpleasant sensations: a feeling of heaviness in the head, headaches of varying degree and intensity, sleep disorders, indisposition, decreased working capacity, alterations in the mood, pain in the joints, retrosternal pain, etc.

Exceptional sensitivity to weather changes and atmospheric conditions is called *meteorosensitivity*, whereas sensations bearing on their inception and course are called *meteorotropic reactions*.

As a rule, climatic changes and weather factors par-

ticularly effect people with a history of head trauma as well as diseases which promote weakening of the nervous system functions. In rare cases meteorosensitivity may be congenital.

During changes of climatic and weather conditions, a headache often develops in persons with a history of a disease associated with headache, or in those with various types of headaches. It also develops in people, who suffer a chronic illness of the nervous system, which is not manifested in any way in normal conditions. Therefore, people who develop headaches because of weather factors cannot be regarded as absolutely healthy. Nevertheless, they are practically healthy.

It should be emphasized that in meteorosensitive people, the development of headaches is promoted by sedentary occupations, failure to observe sensible rules for work and leisure, or their failure to get plenty of rest and fresh air during leaves. Most meteorosensitive people are adults over 40 years of age. The urban population is characteristically 2 to 3 times more sensitive to climatic changes and weather conditions than the rural population.

Headaches and other symptoms that develop in people exceptionally sensitive to climatic changes and weather conditions are encountered more frequently during the intermediate winter-spring (February, March, May) and autumn (October, November) months. This is accounted for by the greater weather variability during these periods as well as by the definite seasonal shifts in man.

Atmospheric pressure changes are of primary importance in the development of headache in meteorosensitive persons. As a rule, circadian rhythms of atmospheric pressure are negligible, being relatively stable but in a definite area of the earth. In persons hypersensitive to weather fluctuations, variation in the atmo-

spheric pressure amounting to 6-8 mm Hg causes a sensation of heaviness in the head, headaches of varying degree, and changes in mood. Apparently not only fluctuations in the atmospheric pressure but also concurrent alterations in other meteorological factors are of importance, including relative humidity and air temperature, force and direction of the wind, regimen of cloudiness, intrusion of the atmospheric fronts and cyclones. The transition rate of weather complexes as well as the intensity of meteorological fluctuations play a definite part. The shorter the time interval during which the weather changes, the more frequent and more pronounced the meteorotropic reactions.

We observe that a headache develops mostly upon an abrupt transition from hot, warm and dry, little-cloudy weather to cloudy rainy weather; from slightly cold weather with temperature drops via zero to cold and very cold weather; from little frost to cloudy, dull and rainy weather; from very frosty to slightly frosty weather. Generally, subjects displaying high sensitivity to climatic changes and weather factors develop a sensation of heaviness in the head and headache 1-2 days before evident changes in the weather.

The reactions toward weather changes (headache and other associated sensations) observed in meteorosensitive people are classified as mild, moderate, and grave (pronounced). Mild reactions are characterized by an unmarked headache, a sense of heaviness in the head. Moderate reactions are manifested by an intense headache and a sense of heaviness in the head, sleep disorders (anxious sleep, early awakening), by the reduced working capacity, unexplainable indisposition. The grave (pronounced) reactions include a sharp headache, sleep disorders, indisposition, pain in the heart, retrosternal pain, and palpitation.

However, meteorotropic reactions are characterized

not only by changes in the well-being. Examination of meteorotropic subjects identified other objective changes: alterations in the vascular tone, fluctuations in blood pressure which mostly rises by 10-40 mm Hg but may also drop by 10-30 mm Hg. The latter changes are typical for subjects with symptoms of vascular atherosclerosis. Additional objective changes also include alterations in the pulse rate, inability to concentrate, and strong emotional reactions.

The weather-induced emotional reactions are particularly hazardous if developed by subjects with occupations requiring extreme attention (drivers, pilots and workers engaged in specialized services).

Some countries not only broadcast weather news but also give warnings against absent-mindedness and depression under the effect of weather changes. These warnings are extremely valuable for drivers and workers in the autoinspection service. It has been shown that broadcasting of these warnings helps to reduce the number of traffic accidents.

What is the mechanism by which a headache develops during drastic changes in the weather? In the majority of meteorosensitive persons, variations in the vascular tone and an elevation of oscillatory mobility of the vessel walls are of paramount importance.

As a result of the climatic and weather-induced changes in the regulatory mechanisms of practically healthy subjects, oscillatory mobility of the brain vessels may increase, leading to stimulation of receptors in the vessel walls and nerve fibers sensitive to pain. These impulses are conveyed to the brain cortex where a sensation of headache is formed.

Despite the fact that we deal with practically healthy subjects, the problems of the prophylaxis and elimination of headaches should be decided by the physician. After the mechanisms of exceptional sensitivity to cli-

matic change and weather conditions have been specified, the physician will prescribe the necessary treatment.

To relieve headaches which develop under the effect of changes in the weather sedatives, hypnotics, and analgesics may be used and, where necessary, specially made drugs that improve the cerebral and heart circulation. It is desirable that patients with pronounced meteorotropic reactions should adhere to a half-bed or bed regimen. Of great value are measures which can reduce meteorosensitivity. Hardening the body with due regard for the season is of no small significance in this respect: air baths, water procedures, plenty of exercise, graded walking, special complexes of therapeutic exercises and, if indicated, prophylactic drug treatment in a hospital. Meteorosensitive persons should follow sensible rules of health by leading an active way of life, staying in the fresh air as much as possible, and making exercises without fail.

**Headache associated with violation of work or leisure routines.** It is known that work is not just a social but also a biological activity because it has played a crucial role in the formation and development of man. It seems unthinkable that man can develop harmoniously without work whatever physical or mental. Why does a headache afflict healthy persons during work? It should be stressed at once that if one is healthy, it is unlikely that effort may bring about a headache. A sensation of fatigue may ensue, but it has nothing to do with a headache and disappears after getting some rest.

We observe that headaches also afflict practically healthy subjects, but they develop, as a rule, because the **work or leisure routines** are violated.

In order to have a better idea of the mechanism for headaches that develop in practically healthy subjects

at work, it is necessary to keep in mind some data on work physiology.

There are two basic types of work: physical and mental. Both the central and peripheral nervous systems are involved in all the types of muscular effort just as muscles take part in one way or another in mental activity.

Any activity is marked by definite phase intervals. Even seemingly continuous long-term muscle tension alternates between work and rest of individual motor units. It is known how difficult the work is that requires a limb to be held in a definite position. In fact it is impossible to hold a hand in the same position for a long period of time. Simultaneously the same hand can perform work requiring the involvement of the different groups of muscles for a long time. Therefore, alternation of work and rest is an indispensable condition to perform normal work.

Rest is that period of time when the body activity is stopped, whereas the physiological changes that had occurred during work are still persistent. Rest makes the physiological changes in the body return progressively to the same level as before work commenced, i.e. during rest. That is why the notions "rest" and "work" are inseparable.

**Rest and absolute inactivity of the body are different.** Rest is a state which differs qualitatively from the state of repose. Rest may be active whereas repose cannot.

During mental activity, the processes of stimulation and inhibition regularly alternate in the brain cortex. This ensures the long-term working capacity of the cerebral hemispheres. The working capacity may be raised by emotional factors which condition the brain cortex by triggering the subcortical structures. Performing other types of effort during mental activity, par-

ticularly muscular work, favours the long-term maintenance of working capacity.

During physical work, many systems and organs of the body experience a number of changes. For instance, the cardiovascular system secures a 6 to 9-fold increase in the blood supply to the working organs. This is done by a 2 to 3-fold rise in the heart rate in untrained subjects and an increase in the blood ejection by the left ventricle in trained ones. The maximal blood pressure rises, whereas the minimal blood pressure drops because of the increased pulse pressure. Breath is not held as long. The respiration becomes more frequent and superficial, while its rate may increase to 30, 40 and over per minute, the norm being 16 to 18 per min. The oxygen requirement increases. During long-term exercise, prolonged stimulation of the nervous system also spreads to those divisions of the nervous system, which ensure vessel innervation. In healthy subjects, the vessels become enlarged to the degree necessary for the brain to be supplied with an adequate amount of the blood under the conditions of brain activation. In persons with a high excitability of the central nervous system, the vascular enlargement may exceed the allowable limits, thereby leading to stimulation of pain receptors in the vessel wall and to the development of headaches. Therefore, during prolonged physical exercise, a headache may afflict only those practically healthy persons who had already developed a high excitability of the nervous system before as a result of various pathological conditions. The headache does not afflict healthy people.

To prevent the development of headaches, it is necessary to observe correct work and leisure routines, to air the rooms where the work is performed. All the people who adhere to such rules can preserve the work-

ing capacity till they are senile. Besides, they will not normally suffer from headaches.

L. N. Tolstoy, I. P. Pavlov, I. M. Sechenov, and D. I. Mendeleev preserved clarity of thought, working capacity, and physical health until old by combining mental and physical work.

People suffering from headaches should observe daily routines very strictly. This point can be illustrated, for instance, by the life of the German philosopher Immanuel Kant (1724-1804). When a child, he was extremely feeble so that everybody predicted that his life would be very short. When adult, I. Kant did his utmost to strictly follow his daily routine. He usually got up at 5 a.m. At 7 o'clock sharp he went out for a walk and went to bed at 10 p.m. The Königsberg community checked their watches by Kant. Over 30 years, Kant did not violate those routines no matter happened. At 40 his health had improved so that until the last years of his life, he did not know what the disease was. The philosopher lived 81 years.

Goethe who lived 82 years and Leo Tolstoy who also reached his 82nd anniversary strengthened their health in almost the same manner.

Headache may develop because of **violation of the sleep regimen**. It is known that sleep is a physiological condition in which the main organs and systems, the nervous system in particular, are in a state of repose. Man spends almost one-third of his life asleep.

In addition to insomnia which is a pathological condition, in the course of life, everybody may experience disorders which are caused by different life situations (e.g. the need to perform an urgent task or work at night, overtime work, the necessity of participating in a certain party, etc.) rather than by a pathological condition.

In such cases the normal length of sleep is shorter,

in rarer cases, sleep may be displaced (night awakening and day sleep), and the rhythm and depth of sleep undergo alterations.

In order to understand why some people develop headaches as a result of violating their sleep routines, let us see how complete sleep deprivation as well as long-term diminution of the lengthy sleep may affect the body.

The follow-up of healthy subjects indicates that complete sleep deprivation causes changes in the body functions. As little as 2-3 days of insomnia cause lassitude, apathy, and loss of emotions. One can see such people walking inconfidently, stumbling at non-existent objects. Their speech loses its distinctness, becomes illegible, and is characterized by repetitions and errors. After the 3rd day people show changes in their psychics. They experience short-term consciousness disorders, memory derangement, occasionally visual hallucinations, and anxiety. Later on short periods of falling asleep with the eyes open may take place. A man's individual tolerance to sleep deprivation varies, but it is not high, only several days. What are the standards for length of sleep? This largely depends on a man's age, individual features of the body, habits, life conditions, and so forth. It has been established that a young man should sleep 8-8.5 h/d, a middle-aged man should sleep 7-8 h/d, and an elderly and senile person 6-7 h/d. It has been recorded that despite the fact that old men are mostly satisfied with a 5 to 6-hour sleep, those who usually sleep for 7 to 8 hours and more are healthier.

It is common knowledge that daily sleep should constitute one-third of the day. If these rules are violated, the activities of the main systems of the body may be impaired, which is followed by the nervous system breakdown.

The people who violate sleep routines can show high fatiguability and irritability, hot temper, touchiness, excessive fatigue after only slight physical or mental exertion, general weakness, appetite and memory loss, unmotivated anxiety and inner anxiety. The follow-up of healthy subjects has demonstrated that usually they did not develop headaches regardless of long-term sleep deprivation or chronic reduction of its duration. But they exhibited symptoms of nervous exhaustion and increased excitability of the central nervous system.

Who may develop headaches in such cases?

Headaches may develop in persons suffering from chronic diseases the clinical picture of which is characterized by headaches (migraine, vegetovascular dystonia, cervical osteochondrosis). They develop in people with a history of traumatic, infectious and other injuries to the brain that are manifested at present by the residual phenomena, associated with headache.

Therefore, it may be inferred that the development of headaches due to violating sleep routines should alert such practically healthy persons to apply for medical help to be examined for chronic diseases or sequels of nervous system lesions.

The nervous system controls the important process of nutrition. At the same time the nervous system itself experiences the effects of the diet. Therefore, **disorders of the diet** may give rise to the different pathological processes associated with headache.

It should be noted that disorders of the diet do not always cause a headache. As a rule, an intense diffuse headache is experienced by persons with hypovitaminosis and avitaminosis, particularly in those with vitamin B deficiency.

An acute headache may develop due to alterations in body sensitivity (allergy) in response to various substances, allergens. Eggs, milk, tomatoes, strawberry,

beans, cabbage, mushrooms, individual types of meat may act as allergens. The people who are practically healthy, but highly sensitive to definite substances, may develop a headache.

Some people may develop headaches because they take large intervals between meals. This is mainly seen in people with hypersecretion of insulin by the pancreas. They develop what is called a hypoglycaemic state; a sharp fall in blood sugar level. In these people, prolonged intervals between meals may produce a sensation of sudden weakness, a sense of hunger, general trembling, and dizziness. Later on they may develop an acute diffuse headache which rapidly disappears after food or sweet tea is taken.

Quite recently it has been shown that a headache may develop because of excessive coffee consumption. Coffee is especially popular in Sweden. In terms of coffee consumption per capita, the Swedish may be labeled as world champions.

It is known that the caffeine contained in coffee affects the entire body. Stimulating the central nervous system, it also potentiates the excitation processes in the brain cortex. Caffeine enhances heart activity, making heart contractions more intense and blood pressure higher. When given in high doses, caffeine activates metabolism, produces insomnia and headache which is not localized to any particular area, although sometimes it is felt more noticeably in the forehead. Some people may develop a throbbing headache.

The prophylaxis of headaches caused by excessive coffee consumption lies in the restriction of its intake. The maximum amount of coffee consumed should not exceed 1 to 2 small cups a day.

Discussing headaches caused by an improper diet, one cannot help mentioning headaches that ensue from **alcohol abuse**. Alcohol is a typical narcotic. It

produces a state of intoxication and may even cause acute life-threatening intoxication. It is customary that any liquid containing wine spirit is called an alcohol.

People who have nothing to do with medicine believe that alcohol has an exciting effect on man. This is a common misconception. Alcohol always inhibits the nervous system. When taken even in negligible amounts, it reduces the processes of inhibition within the brain cortex, thus leading to the activation of the excitation processes as a result of which the motor and speech activities of man may increase. People may become unusually talkative and exhibit excessive gestures and violent movements. Thinking becomes superficial and self-confidence rises. People begin to demonstrate the desire to make the others follow their example. A bit later the process of excitation may also be inhibited. The higher nervous activity is relaxed, thus entailing the disinhibition of the subcortical parts of the nervous system, i.e. of more primitive mechanisms of the nervous system activity. This results in the predominance of vile motives in human behaviour.

A drunken man at first is less active because the nervous system is inhibited, then he becomes sleepy, finally falling asleep. Excessive alcohol may provoke a very deep sleep until the drunken person falls in an unconscious state or, as the people put it, he is "dead drunk". Death may occur in rare cases.

It has been established that the lethal dose of alcohol is 8 g pure spirit per kg of body weight. It is true that this calculation is fairly conventional, since there are plenty of factors that may lower the body resistance to alcohol. Moreover, sometimes acute alcohol intoxications may be observed after intake of small amounts of alcohol. This occurs when someone is excessively fatigued, after grave diseases, and in children.

Acute alcohol intoxication is manifested by a headache which cannot be localized to any particular area, as well as by nausea and vomiting. In severe cases, there are a loss of consciousness, respiratory and heart abnormalities. However, even after common intoxication highly excitable people not infrequently demonstrate, after some time elapses, a pressing or a throbbing headache.

Systematic intake of moderate amounts of alcohol causes the alcohol to get involved in the metabolism, permanently interfering with the metabolic processes.

Alcohol abusers usually develop a diffuse dull headache often accompanied by vascular disorders, face and eye mucosa reddening, and intense pulsation of the superficial head arteries.

Prophylaxis of a headache associated with alcohol abuse consists in abstinence from alcohol.

Television is an outstanding achievement of modern times. It provides knowledge of the outer world and expands the potential of man in obtaining valuable information. It rouses aesthetic feelings and enriches human spirit. Unfortunately, there are a great many families that can be labeled as television abusers. It is common knowledge that immoderate good often turns to evil and the *benefit of television may appear harmful, primarily for the health of man.*

Prolonged television viewing may produce considerable disturbances in the body, not considering the fact that walking in the fresh air, sports, and the joys of communication with friends and relations are sacrificed to the blue screen.

It has been shown that watching television programmes is strenuous work. It burdens the nervous system, organs of vision, the bones and joints. Continuous frame flicker lasting sometimes for hours extremely tires vision and overtires the nervous system. In

addition, long-term television watching in a forced position disturbs the posture and may cause headaches, lower the working capacity, and deteriorate sleep.

The headache which develops is caused by the increased excitability of the central nervous system, chiefly by the *acceleration and augmentation of the brain circulation*. This leads to elevated blood and intraocular pressure. Therefore, people who are predisposed to arterial hypertension or suffer from chronic cardiovascular diseases, glaucoma, cataract or from nervous system diseases should restrict their television viewing. After watching television, it is desirable that they should go for a walk in the fresh air, even for a brief while. This is one of the conditions for the prophylaxis of headaches in such cases. Meanwhile the basic method of the prophylaxis lies in strict observance of television viewing rules. When buying a television set, one should take into consideration the size of the TV screen so it is commensurable with the size of the room where the TV set will be placed. If the screen measures 35 to 47 cm obliquely, the television programmes may be watched at a distance not less than 2 m, and if the screen measures 50 to 61 cm, not less than 3 to 4 m but not over 5 m. The height of the screen over the floor should be from 80 to 90 cm. In order to reduce sharp contrast between the brightly illuminated screen and room darkness, which is extremely harmful for the eyes, it is advisable to switch on a desk-lamp or a standard lamp fitted with a 40-60-watt lamp. Hygienists have shown that continuous television viewing for 2 to 3 hours produces fatigue. Long-term television viewing is particularly harmful for children. It is not recommended that children under 3 years of age watch television. Preschool children should not be allowed to watch television for more than half an hour, school-children under 14 years of age for more than 1 to 1.5 h,

senior schoolchildren for more than 2 hours running. It is not advisable that children watch television every day. It will be quite sufficient if children are permitted to watch TV 2 to 3 times a week.

People who suffer from eye, nervous and cardiovascular diseases should consult the physician as to how long and how often they can watch TV.

**Tobacco smoke** has adverse effects on the overwhelming majority of the systems in the body, primarily on the nervous and cardiovascular systems. It irritates the mucous membranes of the lungs, oesophagus, stomach and intestine. The main hazard is from nicotine contained in the tobacco smoke. By influencing the peripheral centers of the autonomous nervous system, it may impair the control of the vascular tone and heart work. This leads to palpitation and raises the blood pressure. In addition to nicotine, tobacco smoke contains poisonous products of the dry distillation of tobacco and carbon monoxide. After being combined with blood haemoglobin, carbon monoxide reduces the blood capacity for supplying oxygen to cells, tissues and organs. This develops hypoxic conditions, namely oxygen deficiency in the tissues.

Tobacco poisons may cause body poisoning, which is manifested in acute cases by nausea, dizziness, headache, and collapse, even respiratory and cardiac arrests. In chronic cases, intoxication with tobacco poisons may produce mood changes, as well as lead to dyspnoea, cough, pains in the abdomen, and headaches.

A person who smokes a pack of cigarettes a day introduces into his body about 2 kg of pure nicotine during his lifetime. This amount is quite enough to kill 20 thousand people when given at a time.

Why doesn't a smoker die from the effect of the tobacco poisons? This is because the poisons enter the

body in small portions, progressively causing a defense mechanism to form which neutralizes the poisonous substances.

Physicians often hear smokers say that many of them smoke for decades without having a headache. The references are also often made to heavy smokers, particularly to the former Prime Minister of Great Britain Winston Churchill who was a very heavy tobacco smoker but nevertheless lived 90 years and did not suffer from headaches. It must be admitted to be just that heavy smokers are seldom afflicted with headaches. This may be accounted for by the body adapting to tobacco poison. However, those persons who start smoking, those who do not smoke and attempt tobacco smoking and thus smoke a lot of cigarettes will develop acute poisoning without fail. The degree of this poisoning depends on one's age and the amount of tobacco smoked.

The growing body is particularly sensitive to tobacco smoke. It is especially hazardous for persons who start smoking and for those who do not smoke at all, since they have not got the defense mechanisms against tobacco poison.

Acute poisoning by tobacco smoke has been shown very picturesquely in a Soviet cartoon series about a wolf who unsuccessfully chases a hare ("Just you wait, hare!"). Millions of TV spectators may very well remember the wolf trying to drive the hare out of the booth using tobacco smoke. The wolf inhales several times from the whole box of cigarettes and immediately faints, loses consciousness.

Substances contained by tobacco smoke at first excite and then inhibit the nervous system. Tobacco smokers may have a sense of heaviness in the head or they may develop dizziness and then a throbbing headache. The same phenomena are also noted when inhaling air

containing tobacco smoke, as a result of being in a room full of smokers. When smoking, approximately half of tobacco smoke goes directly into the environment. It is necessary to bear in mind that the environment absorbs the smoke of glowing cigarettes and tobacco pipes. This smoke contains much more nicotine and products of the dry distillation of tobacco than smoke which passes through the lungs of a tobacco smoker. It contains 5 times as much carbon monoxide, 50 times as much ammonia, and 3 times as much benzo(a)pyrene, as well as much more cadmium which increases the risk of the development of lung emphysema and atherosclerosis.

Carbon monoxide provokes neither cough nor any another unpleasant sensations. Its action is manifested by impaired coordination, abnormally low attention, and minimized ability to discern relatively bright objects. It may burden the heart whose contraction must become more rapid to supply the body tissues with a greater amount of blood. Carbon monoxide produces an adverse action not only on those who smoke tobacco but also on those who happen to stay in the same room. That is why people in the same room with tobacco smokers are "passive tobacco smokers", since they breathe the smoke from cigarettes or pipes. Therefore, **tobacco smoking damages not only the tobacco smoker but also the persons who happen to be in the same room.**

Despite the fact that the concentration of poisonous substances in the smoke-containing air of the premises is far less than in the smoke, their action is greater as compared to that produced by smoking, inasmuch as the poisons enter the body of a non-smoking person who has no adaptive mechanism for defense against nicotine and other harmful substances.

It has been noticed long ago that the incidence of

myocardial infarction is higher among tobacco smokers. However, this phenomenon has only been explained recently. American scientists have demonstrated that nicotine entering the blood after a deep draw on a cigarette dramatically increases the adhesion capability of platelets. This causes clots and thrombi to form in the blood, obstructing adequate blood supply to the heart muscle, and thus developing myocardial infarction or brain stroke. Therefore, tobacco smoking not only causes headaches but also abnormalities of circulation in the heart and brain.

The main prophylaxis of headaches that occur from tobacco poisons consists in giving up smoking, prohibiting smoking in the work place, public places, and living accommodation. Everybody is able to give up smoking if he is willing, although it is not so simple as it may seem at first glance. Suffice it to mention one of Mark Twain's famous jokes that there is nothing simpler than giving up smoking and that he has done it twenty times. Tobacco smoking is not only a bad habit but also one of the varieties of drug addiction. As it happens in all types of narcotism, the tobacco smoker who tries giving up smoking develops nicotine "starvation", what is called nicotine abstinence. This is a peculiar alteration of the psychics and function of the internal organs, noticeably lowered by persistent tobacco smoking to which a powerful addiction had already formed. Nicotine abstinence may develop after several years of tobacco smoking.

Having mobilized the willpower to inhibit the tobacco smoking motivation, the tobacco smoker will free his body of chronic poisoning and his associates from headaches.

At present there are a lot of agents which may be helpful in quitting smoking. Tabex tablets which should be taken according to a specially devised scheme are

among these agents. Cytisine contained by the tablets is pharmacologically similar to nicotine. By replacing the latter it frees the body from nicotine "starvation" (nicotine abstinence).

The nervous system of man is fairly sensitive to **oxygen deficiency**, therefore staying in a stuffy smoky room, where the oxygen content is subnormal, may cause a headache.

The importance of oxygen deficiency in the ambient air and its relation to the development of a headache is clearly seen in people walking up hill. It is well known that at high altitudes the oxygen content in the air is insufficient for normal respiration. Mountain sickness or high altitude sickness occurs. Normally mountain sickness develops when ascending to a height of 3000 meters or more. Even physically trained, healthy people develop a headache, pain in the ears, fatigue, nausea, difficult breathing. Syncopes may also occur occasionally.

The mechanism by which headaches develop in persons staying in unaired rooms with a low oxygen content is similar to the previously described mechanism of a headache. These people also manifest flabbiness, excessive fatigability, and dull headache. These phenomena disappear in the fresh air. Subjects with low blood pressure and a highly excitable nervous system are particularly sensitive to oxygen deficiency.

The main measures aimed at the prophylaxis of headaches developing as a result of oxygen deficiency should include the observance of the following health and sanitary rules: daily walks, airing of the rooms, sleep with a small window open, prohibition of tobacco smoking in living accomodation and public places.

**Headache may develop as a result of overheating in the sun.** Immoderate exposure to the sun reddens the

skin, causes pruritus to appear, blisters, and rejection of the superficial skin layer. Moreover, the well-being may deteriorate, weakness, high excitability and irritability may occur, palpitation and an incremental diffuse headache which sometimes progresses to a throbbing one may also occur together with sleep disorders.

In severe cases, we observe body temperature increases and even loss of consciousness (sunstroke).

The headache associated with staying in the sun too long is caused by irritation of sensory receptors in the brain vessels and meninges. This may occur in subjects who are prone to headaches. In view of this fact, before going sunbathing, one should consult a physician who will prescribe the appropriate regimen. Meanwhile one of the main rules is progressively getting accustomed to the sun.

## HEADACHE AS A SYMPTOM OF DIFFERENT DISEASES

Today over 50 diseases have been described in which a headache is among the main symptoms of the disease. It is assumed that about 8 per cent of the population on Earth suffer from headaches for which they have to apply for medical aid. It is quite natural that the actual number of persons suffering from headaches is considerably greater, since many of those who rarely suffer from headaches do not consult a physician. They try to relieve their sufferings by taking different analgesics and do not regard themselves as patients.

Cardiovascular diseases comprise the group of ailments in which headache is among one of the main symptoms.

## CARDIOVASCULAR DISEASES

Cardiovascular diseases are now problem number one in medicine. This is largely accounted for by their wide prevalence among the population. The main vascular diseases include essential hypertension, atherosclerosis, migraine, hypotension, congenital abnormalities of the vessels, and heart diseases.

**Headache associated with essential hypertension.** High blood pressure is the basis for developing essential hypertension. Millions of people living on Earth are afflicted with this disease.

Neuropsychic tension plays a great role in the development of essential hypertension. When a person becomes excited or anxious, his pressure rises and he becomes more affected. As a rule, blood pressure drops as soon as the excitement is over. However, if the excitement persists for too long, the person's high blood pressure becomes fixed, and he becomes physically ill.

In addition to the neuropsychic stress, blood pressure increases by being overweight. As body weight increases the vascular system of man becomes longer. It has been established that the blood supply of each kilogram of fatty cells requires about 4 km of capillaries. Therefore, if the person's body weight increases by half kg, its vascular network becomes 2 km longer. This increase in the entire length of the vascular system, measuring in an adult man about 100 thousand kilometres, results in increasing the load on the heart. It must contract more intensely and more frequently to force the blood to all the organs and tissues at a higher pressure. Stable intensification of heart activity may lead to the development of a stable high blood pressure.

It has been proved that excessive salt consumption

with food plays an important role in elevating blood pressure. By promoting water retention in the body, salt favours the swelling of the body tissues, thereby increasing blood pressure. This role of salt may also be evidenced by the fact that essential hypertension is practically not encountered among some African tribes and population groups living in the Northern parts of the USSR, which do not almost use salt.

Hormones, biologically active substances produced in the body, are of importance in the mechanism responsible for blood pressure increase.

However, a rise of blood pressure is not always associated with a headache. Special examinations of large population groups carried out by the WHO programme both in the USSR and abroad have shown that 30 per cent of subjects with a recognized stable elevation of the blood pressure did not make any complaints and learned about its elevation only during the prophylactic screening. Therefore, the disease runs its course without any headache in about 1/3 of cases.

In headaches associated with essential hypertension, of paramount importance is a *change in the tone of the arterial vessels, what is called vascular dystonia*. If the tone of the vessel walls is normal, the vessels enlarge with a temporary elevation in blood pressure and constrict when blood pressure drops. In vascular dystonia this relationship is disturbed and the oscillatory mobility of the vessel walls may increase. This results in the nerve endings in these vessels get stimulated. The impulses are conveyed to the central nervous system where they cause a sensation of a throbbing headache, while during summation of the impulses they give a sensation of a permanent dull headache.

When the blood pressure becomes fixed at a higher level, both the blood and intracranial pressure rises. In addition to a vascular type headache this causes a

headache due to the distension of the brain membranes (because of a rise in the intracranial pressure).

Since the vascular tone varies depending on the periods and stages of essential hypertension, the manifestations and intensity of headaches are also dissimilar.

Several types of a headache can be distinguished depending on the disease stage and intensity of the pathological process.

In the initial period of essential hypertension where the vascular tone just starts being disordered, headaches are not permanent. Normally they appear when there are changes in environmental factors or in rhythms of the body activity: as a result of violation of work and leisure routines, the patients's staying in a hot stuffy room whose air contains a great amount of tobacco smoke, and excessive use of alcohol. These factors being eliminated, the headache disappears. This may occur after rest, sleep, or staying in the fresh air.

As far as the nature of the headache is concerned, at the initial period of essential hypertension, it is very similar to headaches associated with neuroses and develops by an analogous mechanism. During the disease period characterized by a steady change in the tone of the cerebral vessels, the headache assumes, as the physicians put it, a vascular character.

Normally, a vascular headache is manifested by a sudden throbbing pain involving different sites, mostly the occipital or parietotemporal regions. The pain may rapidly disappear as well. Noise in the ears, dizziness, nausea and even vomiting may occur.

In pronounced essential hypertension marked by intracranial pressure elevation, the character of a headache also experiences certain changes. It becomes diffuse with a sensation of heaviness in the head, and an increase in general weakness. The skin of the face

becomes cyanotic. Such patients may develop cerebrovascular crises manifested by attacks of a sharp headache, dizziness, nausea, vomiting, disorders of consciousness up to its complete loss, paralysis of the limbs, and speech disturbances.

What measures should be taken if headache afflicts patients suffering from essential hypertension? **In all the cases the patients should apply for medical aid.** The treatment is to be largely based on the action of the underlying disease. The different disease stages require application of the different treatment schedules. Of great importance is the observance of work and leisure routines: walking in the fresh air, getting plenty of the night sleep, elimination of stress situations. Following a proper diet aimed at minimization of the body weight and reduction of salt consumption, as well as the use of the drugs that promote the lowering of blood pressure, are of no small importance.

If a person develops a headache, it is not advisable to take drugs which reduce blood pressure without consulting a physician. It may be particularly harmful in incipient essential hypertension, since headache caused by this condition can be eliminated with sedatives rather than with hypotensive agents. For instance, in such cases it is sufficient to take validol, a tincture prepared from the valerian root (2 tablespoonfuls) or 30 drops of valerian tincture, 1 tablet of camphor bromide, diphenhydramine, diazepam (seduxen) or chlor-diazepoxide (elenium, napoton) and to try to fall asleep. If the patient cannot sleep, he may take, in addition to a sedative, some analgesic (analgin, paracetamol, baralgin, etc.). Staying out in the fresh air in the park or forest would also be helpful. In acute stages of the disease, patients with headaches may, apart from sedatives, take a hot leg bath (40-45°C) lasting from 10 to 20 minutes, apply a mustard plaster to the back of the

head or a mustard compress to the feet (pouring dry mustard into the stockings). If the patient fails to respond to these measures, he better consult a physician.

Headaches associated with essential hypertension can be reduced or eliminated by *self-massage* performed according to the diagram presented in Fig. 1. The self-massage is made with the palmar surfaces of the fingers. It is recommended that self-massage be performed in the morning, lasting 5 to 7 minutes. In order to ensure better sliding of the hands, talcum or infant's powder may be used. The manipulations include massage to the neck, shoulders and head. Self-massage is started from the neck and shoulders. At first superficial stroking is given, starting from the back of the head downwards along one half of the neck and further to the shoulder joint. For this purpose the arm is bent at the elbow joint while the fingers are placed on the back of the head. The other arm rests upon the table; its hand is supported by the elbow of the hand performing the massage. The superficial stroking is repeated 2 to 4 times (counting by 4). Then the stroking is given with a certain pressure, after which the hand is replaced and the other side of the neck is massaged. The procedure is the same. Then the same areas are given rotatory kneading, with the direction of the movements being the same. In this case the fingers should be slightly bent. The kneading is also repeated from 2 to 4 times. Then the head is massaged. The manipulations are started from the stroking. One of the palms is applied to the forehead, the other one to the vertex, and movements resembling hair combing are made. One hand combs the hair backwards (from the forehead), whereas the other one forwards (from the vertex). The procedure is repeated from 5 to 6 times. If the hair is long, the stroking is given with the finger-tips penetrating to the skin. The temples are mas-

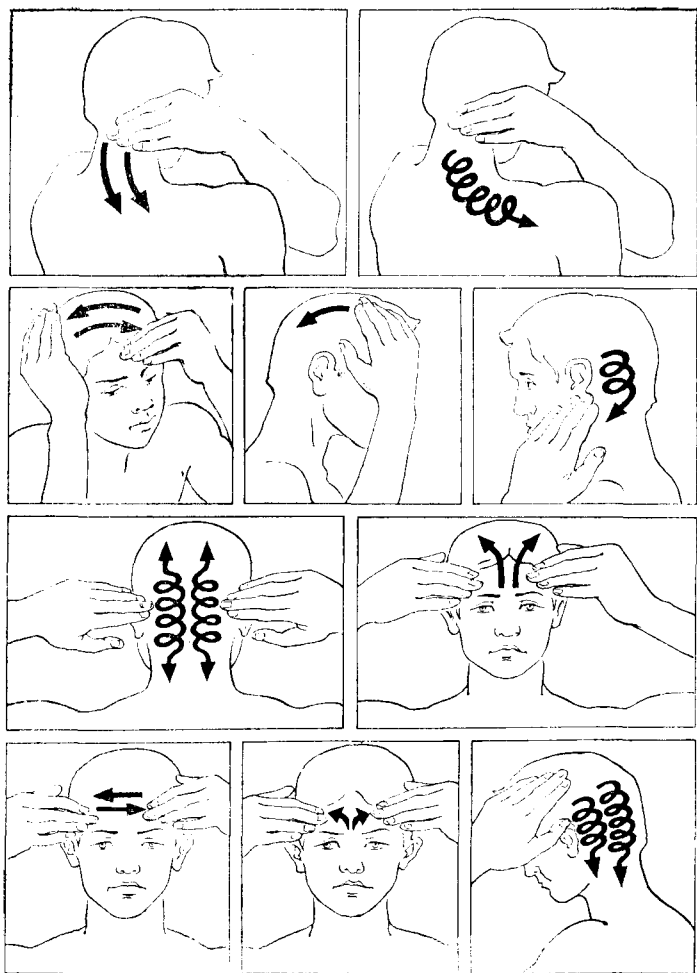


Fig. 1. Self-massage for headaches associated with essential hypertension

saged with the palms, from the outward corners of the eyes progressing to the back of the head and then downwards to the neck. This procedure is repeated from 3 to 4 times. Then the retroauricular region is massaged. The patient sits on a chair, resting on the back of the chair and making mild strokes by the tips of the index and middle fingers beyond the ear from top to bottom in a circle measuring up to 3 cm. The same area is exposed to minor rotatory movements with the fingers and to mild circular rubbing. The procedure is done from 3 to 5 times. Massage to the occipital region is given in the same fashion. The stroking is started from the vertex and then is made backwards with the fingers being slightly bent and separated while the compression is not intense. The same area is given slight rubbing with rotatory movements. The procedure is repeated from 3 to 5 times. Then from 5 to 10 mild strokes are given to the area where the back of the head articulates with the spine. It is done by the tips of the index and middle fingers. In this case the palm base rests upon the head.

After that the forehead and the area around the eyes are massaged. The procedure should be made very delicately so as not to displace the skin. The forehead is stroked with bent fingers, now of the right now of the left hand, along the median line starting from the bridge of the nose toward the hair. Then the forehead is horizontally stroked, starting from the middle toward the temples. The circular rubbings are performed in the same direction. Both procedures are repeated from 3 to 5 times.

The periocular area is massaged in the following way: under the eyes the strokes are made very cautiously, starting from the outward toward the inner angle of the eye with the tips of fingers II-III-IV, after which the index finger is placed over the eyebrow

and the strokes are done in the reverse direction (toward the outward angles of the eyes). The procedure repeated from 3 to 4 times. Then the stroking of the entire head is repeated (the movements should imitate hair combing with one hand moving forwards and with the other one backwards).

Then the parietotemporal and occipital areas are massaged. The fingers which are slightly unbent and separated are placed on the vertex and, making short-term rectilinear rubbings, the fingers are moved toward the ears and neck in a step-like manner: they move downwards, then return upwards to a less distance, then again downwards and finally toward the end of the area being massaged. After that the same area is subjected to circular rubbings.

At the end of the session, the skin is distended and displaced in all the areas of the head by gently pressing with the fingers. The procedure is repeated from 3 to 5 times. It is necessary to bear in mind that self-massage can be performed only after consulting a physician, since in some cases of essential hypertension self-massage is not only unadvisable but may also be harmful. It is contraindicated in stage III essential hypertension, in brain vascular crises, and angina pectoris attacks.

Self-massage is useful when made regularly and over a long time, increasing the degree of compression. Self-massage should be supplemented with a schedule of therapeutic physical training (recommended by physician), walks and tireless playing in the fresh air. As a rule, headaches are relieved after physical training while the well-being and mood improve. If the patient exercises daily, the blood pressure may reduce and even return to normal.

In general, a treatment schedule for headache in essential hypertension should be prescribed by a phys-

ician. The patient should be guided by his recommendations and without fail strictly observe them.

**Headache associated with atherosclerosis of brain vessels.** Vascular headache may often be associated with atherosclerosis of cerebral vessels. In atherosclerosis, the inner surface of the vessels shows numerous deposits of yellowish plaques containing plenty of fatty substances, mainly cholesterol and its esters. This causes the arterial lumen to narrow, interfering with the blood flow. The arterial walls lose their elasticity. Consequently the brain receives an insufficient amount of oxygen and nutritive substances. At the initial stages of the disease this deficiency manifests itself only during intense work which demands an additional supply of oxygen and nutritive substances to the organs and tissues.

This may give rise to the development of a headache, dizziness, noise in the ears, irritability and deterioration of the memory followed by a sensation of heaviness in the head.

Headache is one of the most common as well as one of the earliest symptoms of atherosclerosis of the cerebral vessels. Normally the headache is diffuse, not localized to any particular area. It is accompanied by a sensation of heaviness or fullness in the head, becoming more intense toward the end of the working day, during neuropsychic or physical tension, after alcohol ingestion, and so forth.

As far as its nature is concerned, the headache that afflicts patients with atherosclerosis of the cerebral vessels resembles that occurring in neurasthenia. It is possible that the mechanisms that develop the headache in this case are similar. Involving the cerebral vessels into the atherosclerotic process entails the deterioration of the brain circulation, particularly of the brain cortex, thus developing a headache.

Headaches associated with this condition are marked by constancy commonly developing in the presence of other manifestations of atherosclerosis, namely excessive fatigability, irritability, insomnia, memory deterioration, and high tearfulness.

Pronounced atherosclerosis is characterized by chronic failure of blood supply to the brain while during a slight spasm of the vessels in a branch of the brain arteries the blood flow is likely to be completely arrested. This causes an acute failure of the cerebral circulation to develop which manifests in vascular crises or strokes. A dramatic enhancement of the headache may be followed by a sensation of numbness in the limbs, by dizziness and staggering. Paralysis may also occur.

Essential hypertension and atherosclerosis of the cerebral vessels often develop concomitantly. In some cases, the manifestations of atherosclerosis are predominant whereas in the other cases, those of essential hypertension. It may be inferred that in vascular diseases, a headache develops by the mechanisms characteristic of essential hypertension and atherosclerosis of the cerebral vessels. Headaches associated with atherosclerosis of brain vessels should be treated first by establishing sensible work and leisure routines (sufficient time in fresh air, hygienic gymnastics as a must, performance of feasible work). Activities that promote the improvement of the blood supply to the brain, rather than drug intake are necessary. As regards desk workers they should always combine their mental activity with physical work. A proper diet, strict adherence to a nutrition regimen and recommendations of a physician, periodic intake of the vasodilative drugs and remedies that improve the cerebral circulation are of great importance.

Development of the atherosclerotic process may be

retarded by administering vitamins, particularly vitamin C and polyvitamin "Undevit" which is prescribed after meals in a dose of 1 dragee 2-3 times a day in the initial stage of the disease, and 2 dragees 3 times a day for 20-30 days during marked atherosclerosis. The treatment is repeated after 1 to 3 months. Blood supply to the brain may also be improved by administering cavinton (1 tablet 3 times a day for a month), repeating the treatment after some time elapses. Parmidin (prodectin) decreases the amount of cholesterol deposited on the vessel wall. The same drug may be helpful in improving the circulation within the brain and other organs. The drug is first administered in a dose of 1 tablet 3-4 times a day and then in a dose of 2 and even 3 tablets 3-4 times a day. The treatment lasts from 2 to 6 months.

Diet also plays an important role. It should include substances that interfere with cholesterol being deposited in the vascular tissues. Such substances are contained in appreciable amounts in cottage cheese, ocean fish (herring, cod, etc.), and yeast. **Smoking and alcohol must be completely abandoned.**

As regards the prophylaxis of the disease and headache, of paramount importance is the control over bowel movements. Atherosclerotic patients should have daily stools. It is necessary to take measures preventing gastric flatulence. Analgesics are to be prescribed only in exceptional cases.

**Headache associated with reduced arterial pressure (hypotension and arterial hypotension).** Hypotension is a state of the body marked by abnormally low arterial pressure. Vascular hypotension may have a physiological nature. It mostly occurs in youth and is not manifested clinically, being identified only during occasional measurements of the blood pressure. Hypotension may also be among the symptoms of

some other diseases, such as tuberculosis, peptic ulcer, chronic colitis, heart disease (mitral stenosis), copious haemorrhages, and so forth. However, arterial hypotension may also occur as an independent disease entity. The basis of vascular hypotension is formed by the derangement of the neurohumoral apparatus which controls the activity of the cardiovascular system.

As a rule, young people suffering from low arterial pressure appear practically healthy. The manifestations characteristic of hypotension may develop with age in the course of emergence of sclerotic lesions in the vessels or vascular tone abnormalities.

The major symptom of vascular hypotension is low arterial pressure. In middle-aged and elderly men, it is under 110/70 mm Hg, in women of the same age groups, under 100/60 mm Hg.

The majority of patients with low arterial pressure experience great difficulties in adapting to meteorological factors. They cannot stand being in stuffy rooms, since they are highly sensitive to different odors. Such persons may display excessive fatigue both under physical and neuropsychic tension, and become dizzy. They may also see spots before their eyes when changing the body posture and demonstrate proneness to syncope. It is interesting to mention that such hypotensive persons are rarely afflicted with headaches.

The clinical symptoms characteristic of arterial hypotension may occur with time, in the course of the development of vegetovascular dystonia or incipient atherosclerosis. Headache is among the first symptoms of arterial hypotension.

Headaches may be many and varied. Normally, the pain associated with a headache is dull or pressing, but sometimes it is throbbing, like an attack. In arterial hypotension, a very intense headache is an ex-

treme rarity. The headache often ensues after physical or mental overstrain, after sleep, particularly in the day time. As a rule, the pain is not localized to any particular area: it may involve the whole head, getting periodically more intense or it may develop in the frontal, parietal and occipital regions. Sometimes the headache is accompanied by yawning, nausea and vomiting.

As far as the mechanism of the headache development is concerned, the functional changes in the tone of the vessel walls may play an essential role. Experimental studies have also demonstrated that sharp oscillations in the blood pressure occur when patients suffering from arterial hypotension are changing the body position.

The treatment of vascular hypotension includes the use of the drugs in conjunction with physical factors. Caffeine is among the most common agents applied in the treatment. It is contained by ascophen, novocephalgin, citramon, pyramein, pyrcophen, and pentalgin tablets. The latter two drugs contain the highest dose of caffeine. It is better and simpler, however, to drink strong tea or coffee which also contains caffeine. Staying out-of-doors is a must.

The treatment schedule for headaches associated with arterial hypotension rests on the use of small doses of caffeine along with oxygen inhalations from an oxygen bag twice a day. The treatment is to last 10-12 days and after one-week interval it should be repeated over 1.5 to 2 months.

It is desirable that persons suffering from associated hypotension and headaches take ginseng in the form of a tincture (1:10) in a dose of 15 to 25 drops 3 times a day before meals as well as an eleutherococcus extract in a dose of 2 ml half an hour before meals. The treatment lasts 2-3 weeks. Normally, the patient

should receive 2 to 3 treatment courses with one-week intervals. It must be remembered, however, that the treatment can be prescribed only by a physician. There are no special medical measures aimed at the prophylaxis of arterial hypotension.

**Headache associated with migraine.** The word "migraine" is derived from the Greek word "hemicrania", meaning pain affecting one half of the head (*hemi* means half, *kranion* means skull). The disease first received its name from the ancient Roman physician Galen. Later on the word "hemicrania" was transformed by the French to "migraine". This term has been generally accepted throughout the world and is now used both in the medical literature and in everyday use.

It was believed at first that migraine was a headache involving one side of the head. But it was shown, however, that pain may affect the whole head as well and that in addition to a headache, patients with migraines may have visual, sensory, motor and speech disorders in the form of transient sensations: dizziness, spots before the eyes, noise in the ears, numbness in one side of the body, weakness in one hand and leg, and short-term speech abnormalities. These data indicated that there are several patterns of migraine: common (85 per cent of cases), ocular or ophthalmic (10 per cent of cases), associated (1 per cent of cases), and migrainous neuralgia (4 per cent of cases).

The clinical picture of a migraine is characterized by a recurrent paroxysmal headache of the vascular genesis.

Normally a migraine attack can be divided into three stages. The first stage is marked by a spasm of the cerebral vessels, manifested by a pale face. This spasm gives rise to the development of a headache. This stage lasts a short period of time. Special sub-

stances which increase the capillary permeability are released from blood cells during the first stage. As a result, special cellular hormones are transudated by acting on the receptors present in the arterial walls, these substances reduce the threshold of pain sensitivity. Then they are excreted by the kidneys, abruptly dropping their blood content. This lowers the tone of the cerebral vessels, whereas the capillary spasm is still persistent. As a result, the arterial vessels of the head become enlarged. The face reddens and a headache appears because of the vascular enlargement, signifying that the second stage has ensued. It lasts several hours, subsiding gradually. The third stage is a post-attack period. It is characterized by gradual headache relief, diminution of the sensation of heaviness in the head, which is consequent upon biochemical alterations occurring in the body during an attack. The attack may last from several hours to several days, the mean being 6 to 18 hours.

A migraine attack may occur at any time of the day, usually beginning in the morning. The attack is generally heralded by definite precursors: high irritability, nervousness, a sensation of non-existent odours. These manifestations are characteristic of the common migraine pattern.

Vision disorders are typical for the ocular (ophthalmic) pattern. Spasm of the cerebral vessels, particularly of the posterior cerebral artery, entails the loss of half the field of vision or spots and lines floating in front of the eyes (not infrequently broken). In addition to visual disorders, speech difficulties, disturbances of thinking, and inability of the patient to concentrate may occur. These disorders constitute what is called aura. It lasts from 5 to 30 minutes, followed by a headache, which may involve any part of the head, mainly the frontal, sometimes temporal

and more seldom the occipital region. Some of patients feel pain over the eyes, in the jaws, and even in the back. The pain invades one side of the head. Nausea and vomiting may occur. The pain reaches a maximum between 30 min to 1 hour after its onset and does not persist more than 6 hours. The ophthalmic migraine is characterized by pain localized to the fronto-ocular area, followed by pain in the occipital or temporo-occipital region.

Patients with an associated migraine manifest, apart from a headache, transient weakness in the hands and legs or in the mimic muscles of the face. Speech disorders have only been recorded in some cases. These manifestations usually last several hours.

Migrainous neuralgia is a migraine pattern encountered relatively seldom. The patients complain of pain in the temple and eye. This pain, which is fairly pronounced, always occurs at the same time. It is so intense that the patients toss, being sometimes up against a blank wall, and cry. The attack lasts from 5-10 minutes to 1 hour or more. Migrainous neuralgia is largely encountered in men (4:1), whereas other patterns of migraine occur mostly in women.

What are the causes of migraine? Despite the fact that migraine has been known for a long time, the cause of the disease has not been defined clearly. According to research data, migraine attacks are provoked by a change in the tone of extra- and intracranial vessels. In about 70 per cent of cases, a relationship is observed between a migraine in parents (mostly in mothers) and children. However, proneness to disease rather than the disease itself is inherited. It is assumed that in 60 per cent of cases, the disease occurs before one reaches the age of 20 years. In almost 90 per cent of cases, the disease afflicts persons under 30 years. It may also occur at other ages. Migraine

has been recorded to afflict even 1- to 3-year-old children. Migraine attacks often occur on the time of the first menses (over 70 per cent of cases). Children prone to migraine have a particular mentality. They consider their every step from a critical point of view and are afraid of doing things which might make their associates hold them in bad esteem. Besides, they are highly sensitive to remarks, very touchy and pedantic.

Migraine patients are also very sensitive to changes in the weather. For instance, a change in atmospheric pressure from 6 to 8 mm Hg causes these patients to have a sensation of heaviness in the head, mood alterations, and headaches. Allergic reactions may also develop.

As far as the development of migraine attacks is concerned, both environmental factors and the internal milieu of the body (the status of the hormonal system, etc.) play an important role.

Migraines are provoked usually by overheating in the sun, changes in the atmospheric conditions, being in a stuffy, poorly ventilated room, violating sleep regimen (not getting enough sleep or excessive sleep), failure to observe work and leisure routines, endocrine shifts in the body (menstruation and pregnancy), exposure to powerful environmental irritants (noise, bright light), intense hunger, consumption of some foods (chocolate, citrus, mushrooms, honey, crabs, some types of fish and meat, particularly pork), intake of alcoholic beverages—special brands of wine, especially red wine, excessive fatigue, and diseases of the internal organs. Conditioned reflexes also play an essential part. Attacks occur after the patient comes to a definite place at the same time in concurrence of circumstances which caused an attack before.

Headache may be provoked by anxiety, fear and

fright. This point can be illustrated by the following example. A female patient whose mother and sister suffered from migraine developed a migraine attack at the age of 21 after she had been attacked by a dog. The pain involved the right side of the head. Then the pain began to occur 2 to 3 times a year without any outward reason whatsoever. After an elapse of 5 years the patient suffered another psychic injury (the death of a close friend) and her migraine attacks started taking place monthly, coinciding in time with the first 2 days of menstruation.

This case indicates that the patient had already been predisposed to the disease which did not manifest itself until a definite time, and that the psychic injury (fright) provoked the disease onset.

In some cases it is difficult to establish the cause for the development of an attack.

As has been previously mentioned, this condition is characterized by certain features. Pain associated with migraine is fairly intense, occasionally assuming a throbbing nature. Patients always describe their sensations very vividly, in a picturesque manner. They say that it is as if the pain pushes apart a certain area of the head, mainly the frontal region and the eye, and that they have a sensation of an abscess or so to say "stirring" in the head, etc.

During an attack, the patient's face turns pale or red because of the narrowing or enlarging of the head arteries. Nausea and vomiting may occur at the height of the attack. The patients may have unpleasant sensations in the heart with a more acute appreciation of external stimuli. Light and noise become intolerable, and patients ask to darken the room they are in and speak in whispers.

The attack lasts several hours after which the pain gradually subsides. If the patient manages to fall

asleep, he wakes up without feeling any headache, although general weakness and indisposition may be noted. Between attacks the patients feel perfectly well.

Women afflicted with migraine have been portrayed well enough in fiction. In his novel "The Master and Margarita" Bulgakov describes in great detail and with high precision a migraine attack and its prodromes (aura) in man. One of the characters of the novel, Pontius Pilate, the Procurator of Judaea, developed a migraine attack that started from an imagined sense of rose oil odour which was said to pursue the Procurator from dawn, thus predicting a bad day. Pilate imagined that the rose oil odour is spilled by cypress and palms in the garden and that the odour of the leather equipment and sweat from the escort is mixed with a vicious rose odour. He smells the same rose oil odour as dinner is being cooked. The expectation of an attack makes Pontius Pilate anxious. Being terribly afraid of the coming pain, he exclaims to the gods asking why do they punish him. There is no doubt in his mind that this is once again the invincible, terrific disease... hemicrania involving half the head. Although he realizes that there are no remedies, he tries not to turn his head. Pontius Pilate postpones all his affairs and dreams only of going out of the colonnade, into the depths of the palace, of darkening the room, of falling down on his bed, demanding cold water, calling the dog Banga in a weeping voice, and complaining to the dog of his hemicrania. Pilate feels so bad that he concludes that he must take poison. His associates who are very well familiar with the migraine attack tell Pontius Pilate that his tortures will soon be over and the pain will cease.

It should be emphasized that despite the knowledge of the general scheme according to which a migraine headache develops, its character varies with the per-

son afflicted. An outstanding scientist of the 19th century Labarraque ascertained that those afflicted with migraine are suffering in their own individual way.

It is assumed that each attack of migraine prepares the way for the next one.

In children, migraine attacks run the same course as in adults. An attack is usually preceded by a change in mood: the child becomes very capricious and rubs his eyes. The attack begins with a violent headache which at first may involve a certain part of the head: the frontal, temporal or occipital. The pain may be felt above the eyes or in the eye socket, being first concentrated in one point and then spreading to the entire half of the head. The patient may see spots before the eyes and have a distressing sensation in the stomach. There may occur nausea and even vomiting after which the pain becomes less intense.

In children, a migraine attack lasts 2 to 3 hours. After the headache is relieved, the child may fall asleep for 1 to 2 hours. The child wakes up without sensing any headache. Several hours after awakening, the child may occasionally show general weakness, lassitude, etc.

What should be done if a child has a migraine attack? What drugs can alleviate the attack? One should bear in mind that medicines are commonly of no value for relieving migraine attacks. Moreover, without consulting a physician it is not advisable to give children drugs that are prescribed for adult sufferers. It must be remembered that children are intolerable to numerous drugs. If a child has a migraine attack, it is necessary to give him absolute quiet, to close the window curtains and to remove all other irritants. The attack can be arrested or noticeably relieved by simple measures. Tightly dressing the head with a compression of the temporal arteries, application to

the head of a cloth moistened with cold water, or warming the head with a hot water bottle, is effective. In different patients, cold and heat produce different effects. As a rule, all patients are relieved by applying mustard plasters to the back of the head or to the interscapular region, as well as by taking a hot leg bath.

In grave cases, the children are given strong tea or coffee along with acetylsalicylic acid (aspirin) or analgin as well as sedatives: diazepam (seduxen), relanium, chlordiazepoxide (elenium). During an interparoxysmal period, it is necessary to carry out the treatment prescribed by a physician.

Professor Uzunov (the People's Republic of Bulgaria) has achieved good results by treating children suffering from migraine with acetylsalicylic acid. He prescribes it twice a day for 6 to 7 days at the beginning of each month for 3 to 6 months. According to Uzunov's data, administering vitamin D<sub>2</sub> in a dose of 300 000 or 600 000 IU intramuscularly for 18 to 20 days is effective. Massage to the head and neck, daily walks, especially in the park and forest, eating at strictly fixed hours, and getting plenty of sleep are also helpful.

It stands to reason that many people are eager to know whether children born to parents suffering from migraine will have migraine without fail? No, not certainly! The disease itself is not inherited. The children may inherit only the proneness to it. This proneness may be considerably lowered by bringing children up as quiet, balanced, hardened physically, and as being fond of work. The maintenance of good relations between the members of a family, particularly during the period of the child's development, plays an essential role.

As for migraine treatment in adults, it should rest

on two principles: (1) prevention or elimination (arrest) of migraine attack; (2) migraine treatment.

General health measures are helpful as far as the prevention of a migraine attack is concerned. They include strict observance of work and leisure routines, and sleep and nutrition regimens. The prophylaxis consists in staying in the fresh air, especially in the forest, taking vitamins C, B<sub>1</sub> and B<sub>12</sub>, vasodilative agents, prolonged intake of bromine, valerian, water treatment, massage, and electrotherapy.

Nowadays a powerful vasodilator ergotamine obtained from ergot is widely employed to treat migraine attacks. It should be emphasized that the drug does not possess analgesic properties. If it is helpful, this means that the patient has migraine. Ergotamine is manufactured in the form of 1 mg hydrotartrate tablets and is administered sublingually (2 tablets). The Hungarian drug rigetamin also contains 1 mg ergotamine tartrate. The daily drug dose should not exceed 3 tablets, the total monthly dose amounting to 12 tablets. It cannot be used for more than 7 days. If a more prolonged treatment is required, a 3 to 4-day interval is a must. The drug action is potentiated by taking strong tea or coffee (provided the patient with migraine tolerates them).

Coffetamin is a drug which is also widely used to treat migraines. It is manufactured in the form of tablets containing 1 mg ergotamine tartrate and 10 mg sodium caffeine benzoate. It is necessary to remember that ergotamine may provoke nausea, vomiting, numbness in the limbs, pains in the heart. It is contraindicated in angina pectoris, constriction of limb vessels, in pregnancy, impairment of renal and liver functions, and septic conditions.

Ergotamine is combined with acetylsalicylic acid in a dose of 1 tablet 3 to 4 times a day, with amidopyrine

also given 3 to 4 times a day, or analgin or reopyrine. To prevent nausea and vomiting, belloid, diphenhydramine or pipolphen may be administered.

Administration of diazepam and inhalation of pure oxygen contribute in many respects to the alleviation of attacks. The treatment of migrainous neuralgia is performed along the same lines as migraine. During the interparoxysmal period, the patients should receive corticosteroid hormones.

A universal schedule for migraine treatment has yet to be devised inasmuch as the different remedies can produce directly opposite effects in different patients. Thus, some patients are relieved by applying a hot water bottle to the head, whereas others by applying an ice bag. Some patients feel better after taking vasoconstrictive and others after vasodilative drugs. There are also patients who are relieved by analgesics. The condition of some patients can be improved by drinking hot tea or coffee, whereas others are unable of taking anything during an attack. Some patients are intolerable to being in fresh air, particularly in the forest, since they immediately develop a headache.

One should bear in mind that all the drugs turn out more efficacious the earlier they are administered. All the drugs are of low value when given at the height of an attack. Quiet and sleep seem to be the best remedies for alleviating a migraine attack.

It is desirable that patients suffering from migraine should adhere to a milk and vegetable diet, since meat and fish may contain substances which provoke attacks. Such patients should not use alcoholic beverages. Some of them should not even take strong tea or coffee. Tobacco smoking is also contraindicated. The bowels should be emptied daily. The patient must have plenty of sleep (depending on the age). It is advisable that patients suffering from migraine may

sleep for 1 to 2 hours after dinner and may stay out in the fresh air for the longest time possible. Daily walking is a must. People with sedentary occupations should set aside a regular time of the day for physical work preferably out-of-doors.

Taking into consideration the physical condition of the body, it is also recommended that the patients do physical exercises, have total body massage, water procedures: water baths (36°C) for 10 minutes followed by jet shower toward the legs (40-42°C) for 2 minutes, and a warm leg bath before going to bed.

It is necessary to emphasize that treatment of the symptom is a half-measure. The disease itself must be cured rather than its clinical symptoms. This can be achieved only by the adherence to physician's recommendations.

**Allergic headaches.** Allergy is a state of abnormal sensitivity to a substance or substances which ordinarily cause little or no irritation to people without this sensitivity. Such a state of abnormal sensitivity is characterized by pathological response of the body.

Substances and things producing an allergy are called *allergens*. Almost anything that we touch, swallow or inhale may cause an allergic response. Allergic responses may be produced by pollen of different plants (primula, maple, alder, oak, elm, willow, poplar, birch, etc.), foods (oranges, strawberry, caviare, some types of fish and meat, tomato, potato, oat groats), animal wool, pillow down, tobacco, feed intended for fish (dry *Daphnia* and cyclopes), cosmetic dyes, nail polish, creams, some drugs (iodine, bromine, antibiotics, sulphanilamides, arsenic drugs, barbiturates), different chemical substances, bacteria, viruses, and products of their vital activity.

During an allergy, the human body produces strictly

specific antibodies to some of the substances. Unfortunately, being protective antibodies with respect to these substances, they may be harmful for organs and tissues of the body itself. Injuring the cells, they contribute to the release of biologically active substances—enzymes. Having been accumulated in the blood in excess amounts they may produce an irritating and stimulating effect on different organs and tissues, thereby causing what is called the allergic reactions of the immediate type to develop. At the same time a special factor is formed in white blood cells—lymphocytes. This factor responds only to the allergen which caused its formation; thus the appearance of the allergen in the blood gives rise to an allergic response. Delayed type reaction develops one or several days after allergen ingress into the host, which may also produce a headache.

The mechanism by which the headache develops in an allergy is similar to the migraine mechanism. As a result of the allergic reactions the patients develop increased permeability of the blood capillaries, causing oedema and tissue swelling. This leads to compression of the sensitive nerve endings. Irritation of the nerve endings by products of the upset metabolism formed because of oedema and tissue swelling also play a part. The tone of the head vessels can also be impaired.

An allergic headache is characterized by certain features. Its development may be preceded by swelling of the nasal and eye mucosa or face oedema. In some patients, the headache is accompanied by skin reactions which are manifested by nettle rash. The headache has a sudden onset. The provoking elements may include different infections and intoxications. As a rule, the headache first involves the forehead, less frequently the vertex or occipital region. Its intensity

is very similar to a migraine. The attack may last from several hours to several days.

The treatment of pain of both allergic and migraine attacks consists in taking measures which aim at eliminating the attack and therapeutic measures applied during the interparoxysmal period. During a headache, it is necessary to give the patient maximum quiet, put him to bed, do a cleansing enema, prescribe a milk and vegetable diet for 2 to 3 days. It is also recommended that the patients be given 10 per cent calcium chloride (one tablespoonful 3 times a day), with taking hot leg baths and application of mustard plasters to the neck. If the headache is associated with nettle rash, the itching sites may be wiped with boric alcohol or lubricated with 10 per cent diphenhydramine or 10 per cent anesthesin ointment.

During the interparoxysmal period, the patients should receive the general invigorating treatment with a purpose of decreasing the nervous system responsiveness. The patients should see to daily bowel movement and observe the work and leisure regimen. Daily morning exercise and walking are also a must.

As far as the prophylaxis of headache of allergic origin is concerned, it is important to avoid contact with allergens to which the patient is abnormally sensitive.

**Headache associated with aneurysms of the cerebral vessels.** Aneurysm is a sac formed by dilatation of the wall of a cerebral vessel. As a rule an aneurysm is not recognized for a long period of time. After it reaches a definite size the patients may develop a symptom or symptoms, a headache in particular. Normally, the attack-like pain is similar to the pain felt in a migraine. Sometimes the pain is accompanied by nausea and vomiting. The localization of the pain varies, but mainly invades the occipital region. However, the pain

may be localized to the ocular or oculofrontal area on the aneurysmal side similarly to that seen in patients with migraine.

A repetitive pulsating noise sensed in a definite area of the head is one of the chief signs of an aneurysm of the cerebral vessels. This noise is heard both by the patient himself and a physician. The noise becomes more intense in every case when the blood flow is accelerated: in agitation, in neuropsychic and physical overstrain. Aneurysm can only be diagnosed by angiography, i.e. radiographic examination of the cerebral vessels by administering a radiographic contrast substance which will enable vascular contours to be shown on an x-ray film.

Aneurysms and aneurysmal headaches are usually treated by surgical interventions.

If the disease is of long standing, the aneurysmal wall may become thinner. As a result it is ruptured and the blood is outflown beneath the meninges, largely beneath the arachnoid (so-called subarachnoidal haemorrhage).

The picture of the aneurysmal rupture is very suggestive. After physical tension a sharp pain occurs suddenly in the back of the head. The patients describe it as a stroke to the back of the head. The patient falls down and loses consciousness. Vomiting, psychic and motor excitement may ensue. After the patient regains his consciousness he makes complaints of having the severest headache.

As soon as the first minutes of the rupture the patient should be given the maximal quiet.

**Patients with subarachnoidal haemorrhages should be treated at a hospital.** During conservative treatment, aneurysm is likely to get thrombosed, but not earlier than after 3 to 4 months. After aneurysmal rupture the patient must be placed under a physician's

care. Appreciable mental and physical tension, overheating, use of alcoholic beverages and tobacco smoking are contraindicated in these patients. Meanwhile the surgical treatment of aneurysm at a neurosurgical hospital is the most reliable approach.

### ABNORMALITY IN THE FUNCTIONS OF THE ENDOCRINE GLANDS

The internal secretion glands or endocrine glands secrete and release into the blood special substances which are called hormones.

The endocrine glands include the pituitary, thyroid, adrenals, and sexual glands. Alterations in the functions of these glands lead to the development of endocrine insufficiency coupled with headaches.

Hyperfunction of the pituitary caused by a rise in the amount of the substance secreted by the gland, not infrequently of the neoplastic origin, leads to the development of acromegaly. The illness is characterized by an increase in the limb size and in the size of a part of the face. The disease onset is not marked by headaches. However, after the pituitary tumour reaches a substantial size, the intracranial pressure rises and headache ensues, mostly in the fronto-ocular and temporal regions.

Hyperfunction of the thyroid results in the development of Basedow's disease. It is manifested by exophthalmos, tachycardia, an increase in the thyroid size (goitre), and high irritability. A diffuse headache may also ensue.

An attack-like headache coupled with a state of excitation, enhanced skin pigmentation (colouration) are characteristic of Addison's disease. This disease develops as a result of hyperfunction of the adrenals, mostly because of an adrenocortical tumour.

Patients may develop a headache because of hypofunction of the sexual glands as well. The headache is marked by long duration, intensity and resistance to treatment, resembling headaches associated with neuroses. It is assumed that the mechanism by which they develop is linked with functional abnormalities of the higher nervous system.

Disorders (usually a decrease) in ovarian function during the climacteric can impair the menstrual cycle and develop a peculiar symptom-complex marked by neuropsychic, vascular, endocrine and metabolic abnormalities. A headache is one of the manifestations of this symptom-complex. It is persistent, diffuse, becoming exacerbated periodically. The headache is accompanied by "hot flushes", a sensation of heat, dilatation of the vessels, primarily on the face, sweating, and tachycardia. Sometimes the patients develop numbness and other unpleasant sensations in the limbs, general weakness, high excitability, tearfulness, and sleep disorders. This illustrates how an uncomplicated form of the climacteric runs its course.

If the climacteric manifestations develop in the presence of essential hypertension and atherosclerosis, the headache takes a much graver course. In this case the two processes are as if interwoven, potentiating each other, namely the physiological process of an age-associated evolution and a pathological vascular process. A diffuse headache is often associated in this case with vascular brain crises, lability of blood pressure, noise in the ears, dizziness, and memory deterioration.

In malfunctions of the endocrine glands, headache should be treated according to the physician's recommendations together with consulting the endocrinologist or receiving endocrinologic treatment, since the therapeutic measures will become effective provided

they are aimed at elimination of the underlying pathological condition.

Of paramount importance is the observance of the nutrition, work, leisure and sleep regimen, inasmuch as it is conducive to the adequate regulation of the basic processes of stimulation and inhibition. It is recommended that the patients may receive the symptomatic agents: analgin, amidopyrine, caffeine. In patients with high blood pressure, vasodilative drugs as well as drugs reducing blood pressure may be helpful.

### BRAIN INJURIES

Brain injury is among some of the most common causes for headaches. A headache may be a consequence of an acute craniocerebral injury or else it may ensue as its complication. A headache of traumatic origin is mostly associated with head contusions. Headache caused by head contusion is felt within the first minutes or hours following injuries and then ceases.

The mechanism developing pain is as follows. An injuring or injuring agents may directly stimulate the pain receptors or they may be stimulated by the oedema development at the site of injury. In severe injuries, the vascular tone of the head may change reactively, and the pain of the vascular origin may accompany the local pain.

In head contusions, quiet and application of cold (an ice bag) to the site of contusion are recommended. The largest bumps may disappear after appropriate treatment within a week. The headache disappears much earlier. To eliminate the headache, different analgesics (analgin, amidopyrine, etc.) may be prescribed.

Head injuries may give rise to acute affections of the brain. They are divided into three main groups: concussions, contusions and compressions of the brain. Such a division is conventional, since all three types of trauma may be combined in a patient with brain injury. The type of traumatic affection can be defined only with due regard for the primary syndrome.

**The main symptoms of brain concussion** are headaches, loss of consciousness, nausea, vomiting, retrograde amnesia (loss of the memory for the events preceding the trauma). In mild cases, the headache is only felt within the first minutes or hours following trauma. In grave concussions and in those of moderate gravity, headache may last several days. Normally it is persistent, diffuse, becoming enhanced when moving, moving the head in particular. In some patients, headache is accompanied by nausea, dizziness, noise in the ears, and overt general weakness.

The treatment of headache associated with brain concussion is reduced to the management of the underlying disease. Patients should keep to a strict bed regimen, take analgesics, and have an ice bag applied to the head. They should be given sweet tea or coffee. Of great importance in the treatment of brain concussion is *keeping to the bed regimen* for the period prescribed by the physician. After 1 to 3 days, depending on the gravity of brain concussion, the patients commonly manifest the disappearance of all painful sensations so that they regard themselves completely healthy. However, this is a *common misconception*. The pathological process is under way. That is why the return of the patient to his routine duties deteriorates the course of the disease. Patients who failed to observe hospital rules develop a number of late complications, mainly persistent headaches refractory to the treatment.

**In brain concussions, the general brain manifestations** (headache, general weakness) are followed by the emergence of the symptoms that signify the local injury to the cerebral tissue, manifested by speech disorders, pareses and paralysis of individual muscle groups. The treatment of such patients should be carried out at hospitals.

In some cases all the manifestations of the cranio-cerebral injury may disappear within several hours (occasionally days) whereupon the headache recurs. It may be associated with vomiting and even with loss of consciousness. These pathological conditions may develop as a result of local increased pressure on the brain—**brain compression**. It originates as a result of continuing haemorrhage from the involved branches of the intracranial arteries and veins. An intracranial haematoma thus ensues.

Brain compression brings about an elevation in intracranial pressure and the most intense headache.

Traumatic intracranial haematomas are usually treated by surgery. The earlier the operation is performed the better the disease prognosis. If the chances of surgical intervention are lost, the patient may die in spite of haematoma removal.

The following example is provided for the purpose of illustration.

Patient K., age 38 years, fell ill with influenza and was treated as an outpatient. On day 3 of the disease he got up, slipped and fell down. There was a short-term loss of consciousness followed by a headache which persisted for about 1.5 h. After the headache subsided, the patient felt relatively good. However, the next day he had a sensation of heaviness and a diffuse pain in the head. The patient attributed his sensations to the influenzal condition and began to use remedies against headaches. The pain lessened in intensity. The patient did not inform the physician about the head trauma he had suffered. At the examination he hurried the physician to order him to work. On day 4 after the trauma the district physician

visited the patient and found him in poor health, which was manifested by pale face, weak pulse, and irregular breathing. Since the physician had not been informed about the head contusion, he classified the deterioration of the patient's condition as influenza-induced complication and advised that the patient should be immediately hospitalized. However, the patient disregarded the physician's recommendations. The next day the patient's condition became still worse because of vomiting and loss of consciousness. The patient was brought to hospital by ambulance. Once having informed the hospital physicians about the contusion, he was diagnosed to have a subdural haematoma in the right half of the head. The haematoma was removed. Yet, the chances of surgical intervention had been lost and it was the patient's fault. The patient regained consciousness after the operation but for a short period of time. Then the patient lost consciousness again and died.

In this case the cerebrocranial injury led to a lethal outcome because of a careless attitude of the patient toward his own health and because of his underestimation of the high risk of suffering head contusion.

Headache is one of the most common and prominent symptoms in the late period of a craniocerebral injury. A special term was suggested for designation of this type of headache—a post-traumatic headache. It is characterized by persistence with periodic intensification of pain. In most cases the pain is diffuse, being localized to a particular area less seldom. The patients describe it as a “squeezing”, “throbbing”, “piercing” pain. They often complain of noise in the ears, and compression in the head as if they wore a helmet.

The patients resort to different remedies to decrease the pain: they firmly tighten the head, press different points on the head and face, which may lead to a short-term relief and minimize the pain.

The post-traumatic headache can be caused by cicatricial lesions in the brain membranes, substance and vessels. The presence of the cicatricial lesions in the brain membranes may bring about hypersensitivity

to pain stimuli. The principal role in the development of the post-traumatic headache is assigned to disorders in the dynamics of the cerebrospinal fluid, i.e. to obstruction of the cerebrospinal fluid flow because of the cicatricial lesions. Thus, chronic elevation of intracranial pressure (the hypertension syndrome) may develop. Increase in the production of the cerebrospinal fluid may also be conducive to the development of the syndrome. Elevation of intracranial pressure is recorded in 70 per cent of patients with a post-traumatic headache. It is manifested by a persistent pain which may become worse in the morning and may lessen when rising to the vertical position.

In some cases the production of the cerebrospinal fluid decreases under the influence of brain trauma. This may give rise to development of the hypotension syndrome, i.e. the symptom-complex of low intracranial pressure, which is also characterized by a diffuse headache. Unlike the headache in patients with the hypertension syndrome, this one may become more intense in the vertical and may diminish in the horizontal position. The hypotension post-traumatic headache is encountered in about 20 per cent of patients who suffered head injuries.

In the mechanism by which headache develops at the late period of the cranial injury, an important role is played by an increase in the excitability of the central nervous structures of the brain in response to pain impulses. Owing to this fact the patients become abnormally sensitive to changes in climatic and weather conditions.

Based on this data it can be inferred that the treatment of the post-traumatic headache may be successful provided the causes of its development have been accurately defined.

In headaches coupled with marked symptoms of

intracranial pressure elevation, cerebrospinal fluid punctures are made withdrawing 6 to 10 ml of the fluid. Hypertonic solutions (glucose, sodium chloride, furosemide, etc.) which promote elimination of the fluid from the body are also of value.

In headaches associated with low intracranial pressure, the patients may respond to administration of distilled water or isotonic solution of sodium chloride. Drugs are also used that reduce the excitability of the central nervous structures of the brain. These are hypnotics, bromine with caffeine, analgin, amidopyrine and other medicines (iodine drugs, aloe, and so forth) which favour resolution of the cicatrices.

When treating a persistent headache, the physicians can resort to radiotherapy (treatment with x-rays) and introduction of the air to the subarachnoidal space. Electro- and physiotherapy are also of help.

## INFLAMMATORY DISEASES

**Headaches associated with different infectious diseases.** Acute infectious diseases often begin with a headache. Many of us are aware of the features of headaches associated with influenza, typhoid fever, malaria, and other infectious diseases. The headache is a symptom that frequently marks chronic infectious diseases such as tuberculosis, brucellosis, and rheumatic fever.

In influenza, the headaches are commonly diffuse, becoming more severe under physical and neuropsychic tension. We observe that the headache mainly affects the frontal region. Headaches do not accompany the onset of typhoid fever. However, as the disease progresses, the headache becomes more severe.

Headaches are particularly severe in typhus. The headache is a symptom of the disease and is usually

accompanied by fever. If the disease takes a favourable course, the headache at first reduces, as the body temperature decreases, and then disappears.

In every case, the headache can be eliminated by treating the underlying disease, commonly in a hospital.

**Headache in inflammatory diseases of the brain and meninges.** Intracranial inflammatory diseases, namely inflammation of the meninges (meningitis and arachnoiditis) and inflammation of the substantia medullaris (encephalitis), are usually accompanied by headaches.

**Headaches associated with inflammation of the meninges.** Inflammation of the meninges is termed *meningitis*. The disease affects the pia mater, though in some cases the arachnoidea is largely involved. Inflammation of the arachnoidea is called *arachnoiditis*. The headaches associated with meningitis and arachnoiditis have their own features. The headache also differs during acute and chronic meningitis, and during acute and chronic arachnoiditis. *Acute purulent cerebrospinal meningitis* is a very widespread meningitis pattern. The onset of the disease can be sudden and is manifested by a headache despite otherwise good health. The pain is not localized to any particular area, and it increases steadily as if the head is being pulled apart. The body temperature increases rapidly and reaches 39-40 °C. The patients then develop chills, vomiting and seizures accompanied by muscular tension in the back of the head and dimmed consciousness. The patients seem to be deafened by a racking headache, they moan and clutch their heads with their hands. Any movement, sharp sound or bright light makes the headache more severe. Common analgesics are of no help. The headache lessens after a spinal puncture which reduces the intracranial pressure for

a while. The fluid removed during puncture contains pyogenic cocci (meningococci) that cause meningitis. Purulent meningitis may also develop because of the meningeal inflammation due to bacteria other than meningococci getting into the meninges. The sources of the infection in these cases usually include inflammation of the middle ear (otitis), chronic inflammation of the bones (osteomyelitis), purulent processes occurring on the face and in the oral cavity. Clinically, secondary purulent meningitis is very similar to epidemic cerebral meningitis. Patients afflicted with the illness develop what is called the meningeal symptom complex, in which the main symptom is a severe headache that is not localized to any particular area. It is often difficult for the patients to indicate which part of the head is affected by the pain: frontal, temporal or occipital.

In addition to purulent meningitis, there are also non-purulent or what is called *serous meningitides*. In spite of the inflammatory process, the meninges of patients afflicted with serous meningitides do not contain any pus. These conditions are caused by viruses and certain bacteria (*Mycobacterium tuberculosis*, *Treponema pallidum*, etc.). Serous meningitis may take an acute and a chronic course. Headache associated with serous meningitis is less severe as compared to that associated with purulent meningitis. The onset of the disease may also be sudden, as is the case in purulent meningitis. The pain is not localized to any particular area. This condition is illustrated by frequently encountered serous restricted post-influenzal meningitis (arachnoiditis) caused by influenza virus.

Tuberculosis meningitis is a widespread pattern of serous meningitis. The headache associated with tuberculous meningitis is characterized by its steady increase. Serous meningitis largely takes a chronic

course. It is usually encountered in patients with a history of intracranial infectious diseases and traumatic brain injuries. The headache associated with chronic serous meningitis increases progressively. In the majority of cases, it is diffuse and permanent and is characterized by periodic exacerbations.

Arachnoiditis (inflammation of the arachnoidea) is a type of serous meningitis. As a rule, arachnoiditis affects the pia mater. Nevertheless, the inflammatory lesions are predominant in the arachnoidea. Arachnoiditis is mostly caused by infection but sometimes it may be provoked by a traumatic brain injury. Two patterns of arachnoiditis are distinguished: adhesive and cystic. Adhesive meningitis is marked by the formation of commissures, cystic meningitis by the appearance of different-size cavities in the form of cysts filled with colourless or slightly yellowish transparent fluid. The cysts may appear as single and multiple. The disease symptoms, the nature and gravity of the headache may vary depending on the site of the inflammatory process associated with arachnoiditis, namely on whether it affects the convex surface of cerebral hemispheres or its base, and on its pattern (adhesive or cystic).

During arachnoiditis that mainly affects the convex surface of cerebral hemispheres, the headache may be both diffuse and involving largely the frontal, parietotemporal or occipital regions of the head. This may be accounted for by the features of the dura mater innervation: the anterior parts of the brain are innervated by branch I of the trigeminal nerve, the median ones by branches II and III of the nerve, and the posterior parts by the vagus.

The relationship between the site of the pathological process and the manifestations of the pain syndrome can be established only in rare cases.

Arachnoiditis of the posterior cranial fossa is associated with a fairly severe headache involving the occipital region. The patients experience a permanent pain that may be enhanced at times in an attack-like manner and may radiate to the frontal, temporal, and parietotemporal regions. It should be noted that in every case it is coupled with pain in the occipital region. The headache is often accompanied by nausea and even vomiting.

Stimulation of the sensitive nerve endings and nerve fibers in the meninges, particularly in the dura mater by infectious toxins, is especially important as far as the mechanism responsible for the development of headaches during meningitis and arachnoiditis is concerned. Stimulation of pain receptors in the vessel walls of the dura mater is also essential. It is caused by the chemical (products of vital activity of microorganisms) and the mechanical factors (elevation of intracranial pressure due to hyperproduction of the cerebrospinal fluid). High excitability of the central nervous structures of the brain in response to pain impulses also plays a significant role.

The headache associated with meningitis is treated with symptomatic agents which should be included into a complex of therapeutic measures for the underlying disease. The headache may become less severe after a spinal puncture. *In meningitis puncture is regarded as a therapeutic procedure.* Patients relieved by this measure subsequently ask the puncture to be repeated. In some cases it is only a spinal puncture that may cure the headache. Common drugs used for headache treatment appear to be of little effect when prescribed for meningitis.

In order to alleviate the patients' status, different distracting remedies are used: application of cold to

the head, mustard plasters to the neck, between the scapulae, and to the feet.

Patients afflicted with arachnoiditis should receive different anti-inflammatory drugs and agents that decrease the intracranial pressure. Resorption drugs are also effective.

If a headache is refractory to drug treatment, use can be made of radiotherapy or surgical dissection of the cicatricial and granulomatous tissue.

**Headache in inflammation of the substantia medullaris—encephalitis.** The inflammatory process affecting the substantia medullaris is termed *encephalitis*. It may take an acute or a chronic course. Acute encephalitides are divided into tick-borne, mosquito-borne, and what is called influenzal (epidemic) encephalitis.

Each type of encephalitis is manifested by characteristic symptoms. Headache is among the main symptoms of the disease.

The most severe headache is observed at the initial stage of tick-borne encephalitis. It is characterized by a permanent pain involving the whole head, and by fever. The headache is often accompanied by nausea and vomiting.

The headache associated with influenzal encephalitis, which is not localized to any particular area, is not permanent.

In addition to primary encephalitis described above, some encephalitides develop as a complication of different inflammatory diseases. These are so-called secondary encephalitides caused by influenza, rheumatic fever, typhoid, measles, small pox, and scarlet fever. In these conditions, headache is also one of the main symptoms. Commonly it is diffuse in nature, and in some cases it may be described as throbbing.

Influenzal encephalitis is encountered comparatively rarely. It occurs in the acute period of viral influenza

(types A, A<sub>1</sub>, A<sub>2</sub> and B). Normally, the encephalitis symptom-complex may be seen 1 to 2 weeks after the onset of influenza. Increase in body temperature is followed by a severe headache; nausea and vomiting may also occur. Localized pain involving the facial region or the back of the head occasionally adds to a diffuse headache. It arises due to the affection of the trigeminal and greater occipital nerves. In most cases encephalitis takes a favourable course, therefore prognosis is also favourable.

Rheumatic encephalitis is also markedly acute headaches. It cannot be localized to any particular area either and is accompanied by fever, nausea, and vomiting.

Measles encephalitis occurs by the end of the rash period, being marked by severe headache.

In addition to acute encephalitis, chronic encephalitis occurs. In these conditions, the headache is permanent but mild. Periodically it may become more severe.

Stimulation of the sensitive nerve endings in the meninges, which are also involved into the pathological process, is important in the mechanism by which headache associated with encephalitis occurs. Moreover, the sensitive endings in the vessel walls are also stimulated in encephalitis.

Headache that marks the acute period is relieved by application of cold to the head, administration of analgesics, and remedies which decrease the intracranial pressure. The use of distracting remedies (mustard plasters, cupping-glasses, etc.) is also effective.

Infection penetrating the cranial cavity may give rise to the development of purulent foci, *abscesses*, in the brain substance. Infectious agents may get into the brain via different routes during penetrating wounds of the cranium and during bacterial spreading with the blood or lymph flowing from different puru-

lent foci: from the middle ear in purulent otitis, paranasal sinuses during purulent inflammation, from abscesses on the skin of the face and head, and from the foci of purulent processes in the lungs, bones (osteomyelitis).

Headache in brain abscesses is one of the early disease symptoms. It gradually appears in the presence of the total deterioration of the patients' well-being: poor mood, depression, general weakness, and appetite loss may occur. The headache mainly involves the entire head, in some cases it becomes more severe in some part of the head. The headache may occasionally be a throbbing one. It increases in response to motion, especially in turning the head. When striking the head with fingers, the pain may enhance in the region of the abscess. Headache associated with brain abscesses is characterized by steady progress. Intake of tablets against headache fails to relieve the pain.

As the disease progresses, the nature of the headache is likely to change. It may become diffuse and the patients have a sensation of heaviness in the head. The headache pattern changes due to additional mechanisms responsible for elevation of the intracranial pressure, thereby giving rise to the hypertensive syndrome. In general, high excitability of the central structures of the brain in response to the action of toxicoinfectious factors, an elevation of the intracranial pressure, and tension of pain sensitive formations near and apart from abscesses play a definite role in the mechanism responsible for headache development in abscesses. Administration of different symptomatic agents for treating brain abscesses is either ineffective or provides short-term relief. The main therapy for abscess is its removal in a hospital. It is common knowledge that violating this rule usually results in the patient's death.

**Inflammatory processes in the paranasal sinuses are often accompanied by headache.** The paranasal sinuses include the maxillary (Highmore's), frontal and clinoid sinuses, and ethmoid bone cells. They are lined with the mucous membrane which is the immediate continuation of the nasal mucosa. The foramina of the sinuses open up into the nasal cavity and communicate with it. In view of this infection may penetrate the paranasal sinuses and cause inflammation of their mucous membranes. The inflammatory processes affecting the paranasal sinuses are termed sinusitis (from a Latin word *sinus* for cavity). Depending on which cavity is inflamed, frontitis (from a Latin word *frons* for forehead) and highmoritis (inflammation of the antrum of Highmore) are distinguished.

The inflammatory processes which occur in the sinuses may take an acute, chronic, serous (catarrhal), and a purulent course. Inflammation of several sinuses of the nose—polysinusitis (from a Greek word *poly* for many) and inflammation of all accessory sinuses—pansinusitis (from a Greek word *pan* for all) are also encountered.

Headache associated with sinusitis runs a periodic course, being demonstrable maximally in the afternoon. The cause of such an event is not clear. Obviously, during the night time, the contents of the paranasal sinuses is retained as a result of lying in the supine position. During transition to the vertical posture, the sinuses are gradually emptied and headache diminishes. By the end of the day the headache ceases. No direct correlation has been discovered between the severity of the headache and the nature of the inflammatory process. Mild inflammatory catarrhal processes are often accompanied by a severe headache. On the contrary, headache associated with purulent processes is unmarked.

The pain commonly affects the entire head. In some cases, however, it may be localized to some parts of the head. The headache becomes more severe due to exacerbation of the inflammatory processes in the paranasal sinuses, as a result of cold-induced illnesses, overcooling, physical tension, cough, sneezing, menstruation, and alcohol intake. The headache is made less severe by thermal procedures, especially when combined with the use of analgesics.

Patients with maxillary sinusitis have a sensation that half the nose is blocked up, they feel pain over the antrum of Highmore (in the cheek), in the upper jaw, forehead, and in the entire head. In frontitis, the pain involves the frontal region and reaches a maximum in the area at the bridge of the nose. The pain is permanent with occasional exacerbations, being severe enough in the overwhelming majority of cases. The pain is particularly intense during inflammation of several accessory sinuses.

The mechanism of headache associated with inflammation of the accessory sinuses is fairly complicated. In this mechanism, a definite role may be attributed to the action of toxicoinfectious factors on the sensitive endings of the trigeminal nerve in the mucous membrane of the accessory sinuses as well as on those of the vessel walls and to vascular compression by the swollen tissues.

In inflammatory illnesses of the accessory sinuses, the patients should receive anti-inflammatory drugs in conjunction with analgesics and different types of physiotherapy. Surgical treatment and even radiotherapy may be indicated in cases not amenable by conservative treatment.

**Headache associated with inflammatory processes in the middle ear.** The ear is the organ of hearing and balance. The ear consists of three parts: the external

ear including the floor of the auricle and external auditory meatus, the middle ear including the tympanic cavity and auditory ossicles, the tympanic membrane, the auditory tube, and the internal ear including the auditory organ proper—Corti's organ with a cochlea and the balance apparatus (semicircular canals).

Inflammation mostly affects the middle ear, since infection penetrates from the nasal to the tympanic cavity via the auditory tube. Inflammation of the tympanic cavity is called otitis media. Acute and chronic inflammation of the middle ear (otitis) may be one of the reasons for a headache.

The onset of headache associated with acute otitis may be sudden. The pain mainly involves the ear and occasionally the frontotemporal region. As a rule, the pain is permanent. Occasionally it may become more severe. In some cases patients suffer from throbbing headaches. Normally, the headache is accompanied by fever and, in some cases, by dizziness.

Chronic otitis is associated with a dull headache which involves the side of the otitic ear. In addition to the headache, patients have a painful sensation in the occipital region at the site of the outlet of the occipital nerve and in the supraorbital area.

If the disease is complicated by mastoiditis, i.e. inflammation of the cells of the mastoid process of the temporal bone, a permanent throbbing pain may be caused in the occipital or parieto-occipital region on the side of the sick ear. In such cases the site of the tenderness swells normally, pus discharges from the ear, and the body temperature rises.

The purulent processes in the ear may be aggravated by meningitis and even brain abscesses. The earliest symptom of meningitis is the *appearance of a severe diffuse headache* which involves the entire head and is accompanied by nausea and vomiting.

Uncomplicated otitis is characterized by headache affecting the region adjacent to the inflamed ear. If complications do arise, the pain involves other parts of the head, particularly the occipital and parieto-occipital regions.

In patients with inflammation in the region of the middle ear, headache is caused by stimulation of the sensitive nerve endings of the cranial nerves innervating this area.

In middle ear inflammation, the irritating action is produced by infectious toxins. Elevation of the intracranial pressure as well as an increase in oscillatory mobility of the intracranial vessels and excitability of the central nervous system also play an essential role.

Treatment of headache associated with inflammatory processes in the middle ear is dependent on the treatment of the underlying disease. To alleviate the headache, the patients may be prescribed symptomatic remedies having an analgesic effect: amidopyrine, acetylsalicylic acid (aspirin), phenacetin, etc.

If purulent otitis takes a complicated course with brain tissue involvement, an *urgent operation is required*.

**Headache associated with diseases of the oral cavity, jaws and adjacent areas.** The development of a headache of the inflammatory origin is promoted by diseases of the oral cavity, jaws and adjacent areas, commonly studied by stomatologists; therefore, these headaches may be termed stomatogenous (Gr. *stoma* for mouth, *genesis* for origin).

A stomatogenous headache is largely caused by inflammatory diseases of the teeth, of the upper and lower jaws, and of the tonsils.

Diseases of the teeth are mainly caused by caries, chronic disease of the calcified tissues of the teeth char-

acterized by decalcification of the inorganic portions (lime salts) of the tooth and accompanied by disintegration of the organic portions (enamel and dentin). The microorganisms invade the dental cavity leading to the development of pulpitis, inflammation of the dental pulp. The pulp is innervated with the nerves and vessels, therefore, pulpitis is associated with intense pains.

The teeth are the most painful site in the body. This may be explained by the fact that the tooth contains a great many of pain receptors. One square centimeter of the skin contains not more than 200 pain receptors, whereas 1 cm<sup>2</sup> of dentin (the costoid part of the tooth) has from 15 to 30 thousand pain receptors. The number of pain receptors amounts to 75 thousand at the boundary of the enamel (solid tissue covering the crown of a tooth) with the dentin. That is why dental pain is the most violent pain.

Normally, the pain is localized to the area of the sick tooth. The intensity of the pain depends on the type of the tooth involved. Headache is usually felt on the side with the involved tooth. The pain may irradiate to the eyeball, frontal, temporal and occipital regions of the head. A diffuse headache is almost always associated with the affection of several teeth.

Stimulation of the sensitive endings of branches II and III of the trigeminal nerve as well as of the vegetative ganglia of the face plays a definite role in the mechanism that develops headaches of the dental or, as the physicians put it, of the odontogenous (Gr. *odontos* for tooth) origin. Moreover, stimulation of the sensory endings in the vessel walls and meninges with toxicoinfectious agents is also essential.

Temporary relief of odontogenous headaches may be attained by applying analgin in conjunction with thermal procedures. These measures need to be accom-

panied by treatment of the inflammatory process in the dental area.

The patients may also develop a severe headache as a result of abnormal bite, malocclusion of the teeth. It should be noted that abnormal bite is not an extreme rarity. It may manifest by a headache or facial pain, but not in every case. Abnormal bite primarily affects the temporomandibular joint which possesses certain reserves of compensation. If the adaptation potentialities of the joint are exhausted, a pain symptom or symptoms may ensue. The symptom complex of abnormal bite is manifested by the "clicking" in the temporomandibular joint, dull pain in the ear, in the parotid area, in the parietal and occipital regions. The pain usually becomes more violent toward the end of the day. It increases progressively and persists for hours and in some cases, for days. The pain is mostly localized to one half of the head, but it may also be bilateral.

In such cases the treatment first utilizes thermal procedures performed in the area of the temporomandibular joint, and massage, allowing maximum rest to the joint. After the stomatologist corrects the bite, pain disappears.

Diagnosis of the headache associated with abnormal bite is fairly difficult. Being unaware of the dependence of the headache on abnormal bite, the patients do not bring the stomatological disorders they have to the notice of the physicians (internists, neuropathologists) and naturally cannot get rid of them. One of my patients, age 47 years, complained of violent pain in the right half of the head, irradiating to the upper teeth (by the way the teeth had been extracted several years before). In the afternoon this patient would develop a dull pain in the area of the right ear, which spread to the temporal and supraciliary areas and to

the region of the extracted upper molar teeth. The pain persisted for several hours. Intake of analgin or acetylsalicylic acid relieved the pain, the relief being short-lived, however. The patient also had "happy" days with no pains for several days and weeks but then the pain reappeared with the same intensity. Examination by physicians of different specialties, namely, by internists, an otolaryngologist and even neuropathologist, failed to reveal any pathological changes, while routine treatment did not provide any noticeable improvement. The headache was established to be caused by abnormal bite only after the patient consulted the stomatologist. The headache ceased completely 1.5 to 2 weeks after prosthetics without application of any drug treatment. In this case the headache was caused by abnormal bite and after its correction the patient got rid of the paroxysms of a tormenting headache.

Pains in the oral cavity, involving half of the head or the entire head, may be associated with inflammation in the oral cavity: stomatitis and galvanism phenomena. The clinical manifestations of galvanism caused by the presence in the oral cavity of the crowns made of different metals or metal prosthesis are usually confined to the local symptoms: appearance of the metal smack in the mouth, dryness or, on the contrary, hypersalivation, a burning sensation and other unpleasant sensations in the area of the prosthesis. Later on patients start manifesting high irritability and a diffuse headache ensues, very similar to headaches associated with neuroses. This is accompanied by darkening of the golden crowns and the crowns made of stainless steel, and by reddening of the oral mucosa. These alterations are caused by microcurrents that occur between the different metals (crown and solder) and by concomitant electrochemical phenomena. The improvement is attained by removal of the metal pros-

thesis, replacement of the amalgam fillings by non-metal ones. All these measures bring about the lessening of the local manifestations and elimination of the pain.

Headache may also occur in the inflammatory processes in the area of the palatine tonsils (lymphoid formations). They are situated along the lateral sides of the fauces between the palatine arches and are called pharyngeal tonsils. Inflammation of the tonsils is termed tonsillitis, whereas inflammation of the mucous membrane of the fauces including the pharyngeal tonsils is called quinsy.

Headache associated with quinsy is accompanied by increases in body temperature and difficulty in swallowing. In this condition, the headache is commonly diffuse, becoming more intense as the body temperature rises, and becoming alleviated as the temperature decreases or returns to normal. In acute and chronic tonsillitis, the intensity of the headache may vary with the pain being mainly localized to the occipital region.

Irritation with infectious toxins of the sensory nerve endings and fibers of the cranial nerves innervating the soft palate, throat, and larynx (the glossopharyngeal, vagus and cranial nerves) plays an important part in the mechanism by which headache occurs in tonsillitis.

Treatment of headaches associated with tonsillitis depends on the management of the underlying disease and consists in taking anti-inflammatory measures and, in resistant cases, in tonsillectomy—removal of the tonsils.

**In trifacial neuralgia**, an illness commonly manifested by short-term attacks of a tormenting pain in the face, the pain is usually localized to the area of one or several branches of the trigeminal nerve. In branch I neuralgia, the pain involves the frontal re-

gion, in branch II neuralgia, the region adjacent to the cheek and the nose, whereas in branch III neuralgia, the lower jaw. The pain may also invade the whole half of the face.

The pain attack is accompanied by flushing in the face, lacrimation, contractions of the mimic and masticatory muscles, etc. The attack usually lasts several seconds. On the facial skin or in the oral mucosa there are very sensitive areas; lightly touching them may provoke a pain attack. The attack may also occur during conversation, food intake and mastication. The pain may involve the whole half of the head. The attacks are accompanied by increased salivation, lacrimation and nasal discharge.

The causes of the trifacial neuralgia have not been elucidated so far. That is why the mechanisms of development of the pain syndrome are not completely clear. It is assumed that pain impulses occur because of a rise in the excitability of the trigeminal nerve system, of both peripheral and central systems. In certain cases the trifacial neuralgia may be caused by different pathological processes occurring in the maxillo dental system, paranasal sinuses, mucous membranes of the tongue and oral cavity. The conditions, such as dental caries, maxillary sinusitis, stomatitis (inflammation of the oral mucosa), abnormal bite, etc. are also contributory. Neuralgia of such a type is termed the odontogenous trifacial neuralgia.

In order to abolish the pains associated with the trifacial neuralgia, the patients should be given anti-convulsants (finlepsin, stazepin) prescribed by the physician rather than analgesics. Dry warmth and rest are also helpful. The trifacial neuralgia belongs to a group of diseases which require prolonged, systematic and persistent treatment. During the interparoxysmal periods, the patients are to avoid overcooling. Early sana-

tive measures (health treatment) of the oral cavity and maxillo-dental system, and the treatment of chronic foci of infection in the paranasal sinuses are essential. Sometimes the neuralgia-induced pains disappear after the treatment of the teeth and, in some cases, after malocclusion is corrected. One should bear in mind that neuralgia may be temporarily alleviated by the blockade of the trigeminal nerve with the aid of alcohol and novocaine. Such a blockade, however, may be conducive to the development of neuritis, therefore, application of the blockade as a curative remedy has been abandoned recently.

Morning exercise and walking are also helpful. It is desirable that patients receive a sufficient amount of vitamins with food.

## POISONING

As far as the mechanisms by which headaches develop are concerned, headaches associated with acute and chronic poisoning are similar to those associated with the infectious diseases.

Chronic lead poisoning is characterized by a violent headache which becomes more intense periodically.

Acute poisoning with carbon monoxide causes a diffuse headache which is most pronounced in the frontal and temporal regions.

A permanent headache, not localized to any particular area, commonly marks poisoning by benzene vapours.

In headaches associated with total poisoning, the treatment should begin with neutralization of the poisonous substances. In order to remove them from the body, the patients should be given liquids in abundance and different antidotes.

A headache may also ensue as a result of the appearance of toxins (poisons) inside the body consequent on the derangement of renal function, helminthic invasion, liver dysfunction and gastro-intestinal tract failure, and so forth. These substances may cause self-poisoning (autointoxication) of the body. Insufficient or rare bowel movements (constipation) are among the causes of autointoxication. Prolonged retention of the faeces in the intestine may give rise to putrefactive decomposition of the amino acids contained by the faeces. The degradation products thus formed (different amines, such as cadaverine, histamine, etc.) may cause a diffuse headache, weakness and loss of appetite. Patients may become flabby, pale, rapidly becoming fatigued during any type of activity. Establishing regular bowel movements constitutes the main part of the treatment.

## VISUAL ABNORMALITIES AND EYE DISEASES

Visual abnormalities are among the causes of headaches. These headaches are mainly associated with myopia, hypermetropia and other illnesses related to the weakness of eye muscles. Normally, the headache associated with the eye disease occurs in childhood, being manifest after long-term eye tension: school studies, theatre and cinema attendance, and watching TV. Pain felt over the bridge of the nose is a very suggestive symptom.

As a rule, the headache first involves the frontal or fronto-occipital area, and occasionally the occipital area. Then it gradually involves the entire head, even spreading to the neck in some cases. The headache is dull or throbbing in nature.

Irritation of the nerve endings of the trigeminal nerve in the eye muscles, which are overstrained by various vision disorders, plays an important role in the mechanism that develops this type of headache.

Patients suffering from headaches associated with visual disorders are not relieved by taking medicine in tablets, whereas properly chosen eyeglasses and adherence to rules for visional health may greatly help in getting rid from the tormenting pain.

In adults, the headache may be caused by an eye illness called glaucoma. This illness is characterized by a sharp rise in the intraocular pressure. A headache is the main symptom of glaucoma. Normally, the headache is fairly violent, running an attack-like course refractory to the action of the most powerful analgesics. The headache becomes more intense at night, especially when lying in the supine position. The pain may be localized to the fronto-ocular, temporal, parietal or occipital areas.

During the interparoxysmal period, the headache may either completely cease or lose its intensity.

The development of headache associated with glaucoma may be caused by irritation of the nerve endings of branches I-II of the trigeminal nerve and of the nerve endings in the vessel walls of the eyeball. A highly excitable response to pain stimuli in the central structures of the brain also contributes.

In patients with glaucoma, the headache is alleviated or completely ceases after using remedies that decrease the intraocular pressure. The headache is also relieved by applying cold to the head, taking diphenhydramine, and so forth. If patients do not respond to drug treatment, surgery is resorted to the main purpose of which consists in lowering the intraocular pressure.

## BRAIN TUMOURS

Brain tumours account for about 4.5 per cent of all cases of organic brain diseases. Brain tumours mostly occur between 20 and 40 years of age. In men, the incidence of these tumours is twice as high as in women. The tumours largely arise in the frontal lobes and in the cerebellum. In the majority of cases, they are benign, i.e. they have distinct borders and are characterized by slow growth. However, the non-malignancy of these tumours is relative, since any brain tumour unlike those at other sites of the body, may turn out very dangerous and to a large degree destroy its function.

Headache is among the main symptoms of brain tumours. In general, the headache is stable, dull, becoming periodically more severe. The degree of the headache changes with physical tension, when coughing, sneezing, or changing the body position. At advanced stages the headache becomes permanent, being more overt in children and old men. The headache associated with brain tumours is characterized by a steady increment (not only from the standpoint of intensity but also as regards the duration of a paroxysm). The headache becomes more intense at night or toward the morning. It is often accompanied by copious vomiting in the morning. In the household such a headache is called "brain vomiting".

There is no distinct relationship between the site of a tumour and manifestation of pain, although the localization of pain is likely to play a certain role in some cases. Thus, in tumours of the frontal lobe, the pain largely involves the frontal area, whereas if a tumour is sited in the temporal region, it is sensed in the temporal area. At the same time the occipital tumours are manifested by pains in the frontal, temporal or parietal areas with no pain in the back of the head.

Therefore, the headache associated with brain tumours may be localized to a particular area. However, one can often see that the tumour site does not correlate with the region involved by the pain. Such a relationship is typical only for superficially lying tumours. The pain associated with small tumours may be absolutely unbearable, and that associated with sizable ones unmarked. The mechanism for developing headaches associated with brain tumours is fairly complicated. If a tumour is situated near the meninges, the pain occurs due to the stimulation of the meningeal nerves. Of importance is also an elevation of the intracranial pressure, stimulation of the sensitive cranial nerves and nerve endings in the walls of the venous sinuses and arteries of the dura mater, provided the tumour is localized near these formations. The effects of various biochemical alterations developing in brain tumours on the nervous system also play a definite role.

Of no less importance is individual sensitivity to pain stimulation. This may account for dissimilar intensity and patterns of headache in different patients having tumours of the same structure, size and site.

Headaches associated with brain tumours may be temporarily relieved by the use of analgesics. However, after an elapse of a short period of time the headache manifests itself with the same strength.

### CERVICAL OSTEOCHONDROSIS

Osteochondrosis (Gr. *osteon* for bone, *chondros* for cartilage) of the spine is a primarily degenerative process that develops in the intervertebral discs, the cartilaginous layers between the vertebrae. Each intervertebral disc consists of a fibrous ring and a jelly-like nucleus, that is why the intervertebral discs play a

role of uncommon "bumpers" which distribute the pressure on the vertebral column uniformly.

In osteochondrosis, the alterations mainly involve the jelly-like nucleus. After the nucleus is dried up, the disc loses its elasticity. The fibrous ring is defibered, while its fibers are destroyed with the appearance of cracks. As a result, the disc becomes flattened and bulges beyond the vertebrae. The vertebral bodies get closer, which leads to an increase in the load on the intervertebral joints. The joints develop degenerative changes and the disease (spondyloarthrosis) ensues.

The structure of the vertebral bodies manifests reactive changes mainly along their edges. Osseous vegetations are formed along the edges of the vertebral bodies, looking like beaks, pins and horns. These changes in the vertebral bodies (deforming spondylosis) may be regarded as compensatory adaptation of the body. If no complications occur, these changes may remain asymptomatic.

Osteochondrosis and deforming spondylosis are often enough encountered in practically healthy subjects over 40 to 45 years. The changes may be detected in all the parts of the spine, however they occur most frequently in the vertebrae of the lumbar and cervical parts of the spine. Despite the fact that changes may be detected in any of the intervertebral discs, they occur most frequently and primarily in the discs where the maximal load falls. In the cervical part of the spine, the changes in the disc between V and VI vertebrae appear the most demonstrable.

The changes of the osteochondrosis and deforming spondylosis type are regarded by some persons not versed in medicine as "salt depositions" in the vertebrae, with these depositions being not infrequently assumed as consisting of table salt (sodium chloride).

However, this process is very complicated and has nothing to do with sodium chloride. It is linked with metabolism and cannot be treated in such a simplified manner.

There is no definite relationship between changes in the spine seen on the x-rays and pathological manifestations. The changes that show on the x-rays are very often not accompanied by any pathological symptoms. In some cases the patients may, on the contrary, demonstrate marked clinical symptoms of osteochondrosis in the absence or in the presence of very insignificant changes on the x-rays.

To gain a deeper insight into the mechanisms that develop the symptoms of cervical osteochondrosis, one should bear in mind that the bodies of the cervical vertebrae are permeated with blood vessels that supply blood to the brain and spinal cord as well as by nerve plexuses. The right and left vertebral arteries pass through the channel of the transverse processes. Entering the cranium via the great foramen they supply blood to the brain stem and occipital lobes of the cerebral hemispheres. Each vertebral artery is wrapped by the sympathetic plexus, with the vertebral nerve passing nearby. Therefore, the pathological manifestations seen in cervical osteochondrosis may be reduced to vascular disturbances, changes in nerve plexuses and fibers outgoing between the vertebrae, from which the surface nerves of the head (great and minor occipital and great auricular) are formed. The main syndromes associated with cervical osteochondrosis include the vertebral artery and hypertension syndromes, cervical migraine, radicular and hypothalamic syndromes, etc. All these syndromes are mainly characterized by headache, but the mechanism by which it develops is different in each case.

Headache associated with the vertebral artery syn-

drome ensues at an early stage of the disease. The pain is diffuse in nature, being most pronounced in the cervico-occipital region. It is persistent and becomes periodically more intense, particularly in the morning. During paroxysms, dizziness may occur, being more overt on head turns. A decrease in hearing in one ear, visual disorders, and staggering when walking may also be occasionally noted.

The headache originates from the compression of the vertebral arteries by osteofibrous vegetations. The signs of the compression may increase when turning the head while all the pathological manifestations become more intense.

A bulging headache, which becomes more intense by turning the head and moving the eyeballs, is one of the early signs of the hypertension syndrome (rise of the intracranial pressure). The headache may be accompanied by nausea and vomiting. The attack may last from 2 to 5 hours. A headache of this type results from compressing the arteries and veins in the intervertebral foramina interfering with venous blood outflow from the head. This leads to venous congestion in the cranium and to the development of the hypertension manifestations.

In cervical osteochondrosis, the "cervical migraine" syndrome may ensue. Such a migraine has nothing to do with the classical migraine. It has been termed this for the pain involves, in addition to the neck, half of the head as well. The "cervical migraine" is characterized by a headache which involves largely one half of the head. It first ensues in the cervico-occipital region and spreads to the parietal and temporal areas and further to the eye. In most cases, the pain takes an attack-like course and is accompanied by vomiting. The attacks last from 6 to 10 hours. The patients usually turn the head to the side opposite the pain.

The "cervical migraine" may be among one of the early symptoms of cervical osteochondrosis. The symptom-complex manifests as a result of stimulation of the vertebral nerve.

Patients suffering from cervical osteochondrosis may note the symptoms linked with disturbances in the activity of the definite brain parts, namely of the diencephalic or hypothalamic areas. The patients develop a headache, a sensation of falling, palpitation, and chills. All these manifestations occur in the form of attacks lasting from 20 to 30 minutes and usually terminating in copious and frequent urination. Pain in the heart region may also occur. This symptom-complex is called the hypothalamic syndrome. It originates from long-term stimulation of definite cervical (sympathetic) ganglia. Apparently, the chronic failure of the cerebral circulation because of the compression of the vertebral arteries responsible for blood supply to the hypothalamic area is also significant.

Patients afflicted with cervical osteochondrosis may have a radicular syndrome characterized by pain in the cervical part of the spine, irradiating to the arm, as well as pain in the occipital region. The pain is caused by irritation of the nerve roots, and by the development of oedema as a result of their compression.

In marked osteochondrosis, the patients sense a crunch and crackle in the cervical area when turning the head. They say that they feel as if something in the neck "has got snagged". If the patients fail to receive treatment, the manifestations described are likely to become more intense.

The causes of spinal osteochondrosis are not sufficiently clear. There is no doubt that abnormal metabolic processes that lead to degenerative changes in the cartilages and joints, the aetiology of which cannot be reduced to a factor, are implicated. In view of the fact that the disease chiefly affects middle-aged and elderly

people, it may be necessary to consider the factors of the age-associated depreciation of the body.

A relationship has been established recently between the occurrence of chronic infectious processes (quinsy, tonsillitis, etc.) and the origin of osteochondrosis. That is why the treatment should be strictly individual.

The treatment of headache associated with the cervical osteochondrosis is to be determined by the syndrome whose basis is formed by the headache. In all the cases where a headache has an acute onset, it is necessary to give the cervical part of the spine maximum rest. The patient should be put to bed. Overt movements in the cervical part, particularly bending and unbending, are not desirable.

It is recommended that patients take vasodilative drugs that improve the cardiac and cerebral circulation. During exacerbations, the treatment of headache should be performed only under the physician's control.

The drugs that make the metabolism return to normal may be administered during the interparoxysmal period. The drugs that lower hyaluronidase activity, such as acetylsalicylic acid, diphenhydramine, vitamins C and B<sub>1</sub>, are also prescribed.

In order to prevent the development of secondary phenomena associated with osteochondrosis, a complex of special physical exercises has been devised. The performance of these exercises is among the basic measures aimed at preventing headaches associated with cervical osteochondrosis. The following complex of exercises is recommended (Fig. 2).

1. Sitting on a chair, back pressed against the chair, arms bent at the elbow joints and fingers applied to the shoulder joints. Make circular movements with the arms at the shoulder joints, rotate the arms first upward and then backward, and progressively increase

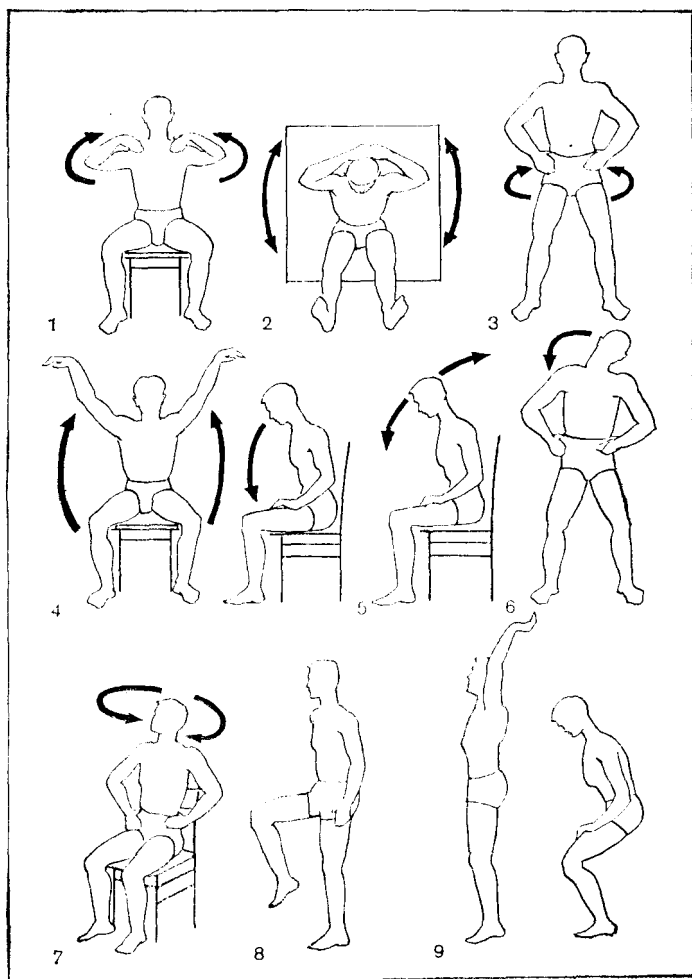


Fig. 2. A complex of exercises for cervical osteochondrosis

the amplitude of movements. The movements are slow. Repeat 5 to 6 times.

2. Sitting on a chair, place the hands behind the head and clasp the fingers. Separating the elbows backward, breathe in; rotating the elbows forward, breathe out. The movements are slow. Repeat 5 to 10 times.

3. Standing with legs wide apart and hands on the waist, rotate the body to the left and to the right (4 to 5 times to each side). The movements are slow. Breathe voluntarily.

4. Sitting on a chair, raise the relaxed hands and breathe in; drop the hands and move them backward, bent slightly forward without bending the head and breathe out.

5. Sitting on a chair, back pressed against the chair. Incline forward and backward stopping in the intermediate position of the neck (1 s). The movements should be slow. Repeat 4 to 5 times on each side. Incline at a maximum amplitude but without any tension till pain ensues. Breathe voluntarily.

6. Standing, legs wide apart and hands on the waist. Turn the head to the right and to the left simultaneously bending it to the shoulder (4 to 5 times to each side). The movements should be slow. Breathe voluntarily.

7. Sitting on a chair, hands on the waist. Make rotatory movements with the head to one side (2 to 3 times), and then to the other side, with the same number of movements. Don't hold breathing during exercise. Take 5 to 10-second intervals between exercises and change the direction of movement. Increase the number of rotations with time, being guided by one's well-being. The main criteria are the heart rate and dizziness. Stop exercise if dizziness and tachycardia occur.

8. Walk, raising the hips highly. Breathe voluntarily.

9. Standing, breathe in with hands upward; breathe out dropping the hands and half squatting while relaxing. The duration of exercise-making is about 12 to 15 minutes. Repeat exercises 3 to 4 times a day.

In the past a complex of exercises aimed at strengthening the cervical muscles according to the self-resistance principle (isometry) has been devised.

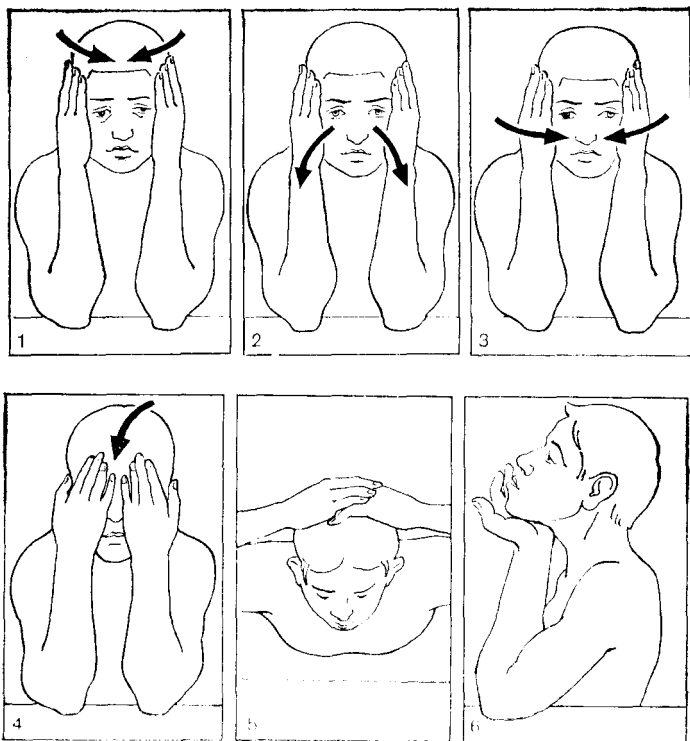
It is based on the active physical tension of the cervico-brachial girdle muscles (Fig. 3). The following exercises are suggested:

1. Sitting, hold the head with the hands in the normal physiological position. At the same time attempt to turn the head to the right and to the left. In these conditions, the cervical vertebrae remain practically immobile relative to an imaginary axial line, whereas the muscles of the cervico-brachial girdle experience appreciable physical tension when meeting the resistance on head fixation.

2. Fix the head with the hands in the normal physiological position. Try to incline toward the shoulder, both to the right and to the left. Resist with the hands.

3. Fix the head in the normal physiological position. Put pressure on the head in the area of the right floor of the auricle with the right hand. Make the same movements with the left hand to the left half of the head.

4. This exercise is better performed sitting at a table. Bend the hands at the elbows and place them apart on the table. Place the palms to the forehead. Press the forehead against the palms. It is more difficult to do this exercise without leaning with one's elbows to the horizontal surface, since the hands get tired very rapidly and become weak.



**Fig. 3. A complex of exercises for muscles of the neck by self-resistance (isometry)**

5. Clasp the hands at the back of the head. Press the head against the palms of the clasped hands.

6. Exercises for deep muscles of the upper part of the spine, muscles of the throat and soft palate. Incline the head slightly backward, protrude the lower jaw maximally forward; lean the tip of the tongue alter-

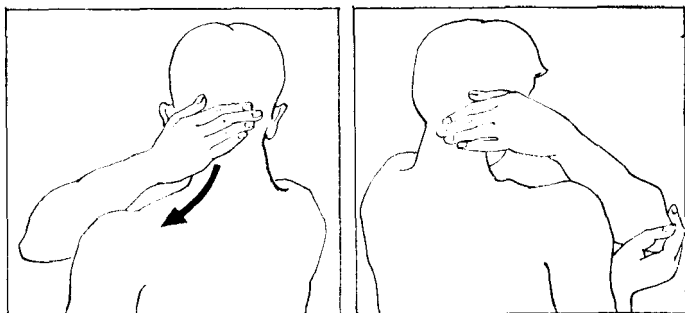


Fig. 4. Self-massage to the neck and cervicobrachial area in patients with cervical osteochondrosis

nately to the upper palate and lower teeth. The chin can be slightly supported with the hand. The length of each exercise is between 5 to 15 seconds. Repeat exercise one by one several times a day.

Performing these exercises does not require any special conditions. They can be done at home and at work, as well as even in transport to and from work.

Adherence to an active regimen including exercises for the muscles of the neck and spine is one of the effective measures to prevent spinal osteochondrosis and neurological complications.

*Self-massage* plays an important part in the treatment of headache associated with cervical osteochondrosis. The main manipulations include stroking, rubbing, kneading and vibration of the muscles.

The length of self-massage should not exceed 15 minutes, if done 1 to 2 times a day. It should be started and completed with stroking. It is advisable to do it in the sitting position, turning the head to the side

opposite the side of the neck to be massaged. If the patient fails to do it because of a violent pain, the massage can be done with the head fixed in a position which minimizes the painful sensations.

The stroking is given to the lateral surfaces of the neck starting from the back of the head toward the humeral joint, using the hand opposite the side to be massaged (Fig. 4*l*). The elbow of the massaging hand can be supported by the other hand (Fig. 4*r*). The squeezing is given in the same direction. It is made with the palm of the hand and thumb prominence. Then the circular and longitudinal strokes are made 3 to 4 times with the finger pads. The skin is rubbed with slightly bent fingers. It should be pressed, displaced and stretched. The kneading is done in the same direction with the palm of the hand and thumb prominence. After the fingers are slightly bent, the circular rubbing and kneading are given with the pads of the four close fingers. At first the massage is given to the cervical muscles adjacent to the spine and then to other muscle groups located slightly to the front and further to the anterior part of the neck (Fig. 5*l*). One should not compress the vessels of the neck violently, since this may result in fainting. The posterior of the neck is massaged more intensely, particularly the upper part. In these cases kneading and vigorous stroking are made. Then the stroking is given to the posterior and lateral surfaces of the neck with palmar and rear surfaces of the fingers. The massage of the neck is completed with clasping patings.

Each procedure is repeated 3 to 10 times. After the massage of one side is completed, the other side is massaged in the same succession. During massage, particularly intense pressure should be applied to the muscles of the posterior and lateral surfaces of the neck. The massage can be performed simultaneously

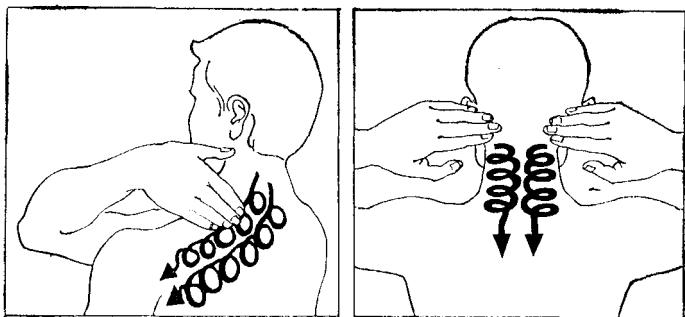


Fig. 5. Muscle kneading in headaches associated with cervical osteochondrosis

from both sides (Fig. 5r). The anterior part of the neck should be given stroking alone.

The self-massage can be completed with the use of a mechanical vibromassager. The direction of the massage is the same, but the manipulations should not last more than 2 minutes. It is preferable to use a sponge in the capacity of a head.

During massage, one should not hold breath, since this may cause the derangement of the venous blood outflow from the brain and distressing sensations.

As a rule, self-massage provides appreciable relief of the suffering, particularly if done in the morning.

## NEUROSES

According to the modern concepts, neuroses are patterns of emotional reaction caused by unrecognized conscious or unconscious motives called conflicts. The disease ensues after psychic traumas and is marked by reversibility of the pathological disorders and the lack of the psychic symptoms. It is generally recog-

nized that neuroses may be divided into three main forms: neurasthenia, hysteria and neurosis of obsessive conditions.

The main symptoms of *neurasthenia* are irritability, excessive fatigue after only slight exertion, and insomnia. The word neurasthenia means nervous weakness.

Headaches associated with neurasthenia are characterized by diversity as regards the manifestations and severity, the duration and area of pain concentration. The patients describe such headaches as sensations of pressure, tightening and tension. They say they feel as if they had a helmet, cap or collar on the head. Sometimes they complain of a throbbing headache and painful sensations which they cannot describe accurately enough or localize. The patients are also tender when touched on the hairy part of the head.

Headaches associated with neurasthenia are usually concentrated in the frontal area, vertex and other regions of the head. The neurotic headache becomes more severe because of attention strain (long-term reading, watching movies and TV, etc.), staying in stuffy, poorly aired rooms or different situations which injure the psyche.

In addition to headache, patients with neurasthenia have additional complaints, such as pain in other parts of the body (loin, limbs and internal organs), inability to concentrate, absent-mindedness, undue concern about symptoms. They sleep badly, awaken readily, and cannot fall asleep for a long time.

*Hysteria* is a fairly common form of emotional reaction in which the patient tends to act out his distress in exaggerated and dramatic form. These patients are generally very suggestible. They may also manifest motor, sensitive and autonomous disorders.

Headache associated with hysteria is encountered less frequently than in neurasthenia. Hysterical patients

describe their painful sensations in a very picturesque manner. They develop pain mostly after they are informed about somebody having a painful sensation, i.e. the pain in such patients occurs according to the type of imitation. In these cases the patients are at a loss to describe the character of the pain accurately enough or to localize it to any particular area. It is fairly characteristic that headache associated with hysteria repeats with every fresh emotional tension.

Hysteric patients depict their headaches in great detail, resorting to very picturesque comparisons. For instance, they say that they feel as if a motor knocks in the head, or something that gets tense and then is about to burst, and so forth. Moreover, the patients complain that they have a sensation of head freezing as if something cold were applied to the vertex or to the back of the head.

*Obsessive neurosis* is a condition which is manifested by psychasthenia, being out of contact with reality, fixed ideas or actions, doubts and weak willpower. This type of neurosis is rarely associated with headaches. In this condition, the headaches are characterized by the lack of precise localization and by mandatory and persistent situational dependence.

It is necessary to emphasize that in different patterns of neurosis, the patients associate their headaches with such sensations as an "empty head", "cotton wool or prosthetic head". These sensations are very typical for neuroses, but they have nothing to do with headaches.

The manifestations of a headache associated with neuroses, especially its intensity and character, are determined in many respects by the patient's mood and change depending on how his attention is distracted from the pain.

The major symptom which is usually taken into con-

sideration in recognition of a neurotic headache is that it ensues after events and episodes which exert a traumatic action on the psyche or after the mere mentioning of such events and episodes, which does not mark other types of headache. One should bear in mind, however, that psychogenous factors may contribute to the development of headaches not only in neuroses but also in some other conditions.

The basic principle of the treatment and prophylaxis of a headache associated with neuroses lies in the treatment of a neurosis and elimination of the causes of its development.

At the beginning of the treatment the analgesics and hypnotics may be used if indicated.

In view of the high reactivity of patients suffering from neuroses, a therapeutic effect is usually attained using drug doses which are considerably less than the mean doses applied in medical practice. As a rule, a patient is given a dose of one or another drug on a strictly individual basis.

Good results may be obtained with the use of acupuncture. During summer vacation, patients with functional headaches may demonstrate improvement of their health status and cessation of headaches which is likely to be accounted for by the beneficial effect of sunshine.

Marked analgesic action in patients with neurotic signs is accomplished by oxygen inspiration, staying in the fresh air, especially in the park or in the forest, walks before going to bed and moderate exercise.

In patients suffering from headaches of neurotic origin, drug treatment is less helpful than adherence to the sensible working and leisure routine. These patients should not be permitted to do jobs that violate a definite regimen, namely jobs sometimes protracted

until night hours, sometimes replaced by burdensome idleness.

It is advisable that these patients always do morning exercises. Successful treatment of neurotic patients depends in many respects on the patient's confidence in the physician. The treatment with the use of suggestion and self-suggestion is usually of value. The first type of treatment should be performed by a psychiatrist.

## CONCLUSION

Having read this book, the reader is likely to understand that headaches are produced by a diversity of causes and that the mechanisms by which they develop are fairly complicated.

If a headache is persistent, particularly if it steadily increases, it is necessary to consult a physician and describe the headache in as much detail as possible.

The treatment and prophylaxis standards are high enough in every region of the USSR, so that the right to decide on the patient's referral to other therapeutic institutions for counselling is only given to the treating physician and can be done only *with his consent*. In this case the patient will be supplied with all the necessary documentation concerning the history of the disease and the results of auxiliary methods of examination. This will enable the correct diagnosis to be made and adequate treatment to be more accurately prescribed and within the shortest time possible.

The treatment of a headache may be successful, provided the patient strictly adheres to all the physician's recommendations and prescriptions based on the diagnosis of causes of the headache.



The booklet discusses the headache which is among the most prevalent symptoms marking different pathological conditions of the body. It shows how headaches may develop in healthy subjects and in those afflicted with different diseases. The causes for headaches, the mechanisms by which they develop, the features of the various types of headaches, and the basic principles of headache prophylaxis and elimination are reviewed. Medical recommendations for patients suffering from headache are given. The booklet is intended for a wide spectrum of general readers.

